

PERFORATED TAPE READER

SERIAL NUMBER 6197

MODEL 2500



RACK MOUNT



CASE MOUNT



DIGITRONICS CORP.
ONE ALBERTSON AVENUE • ALBERTSON, NEW YORK • PHONE HT 4-1000

...pioneers in data processing technology

NOVEMBER 1964

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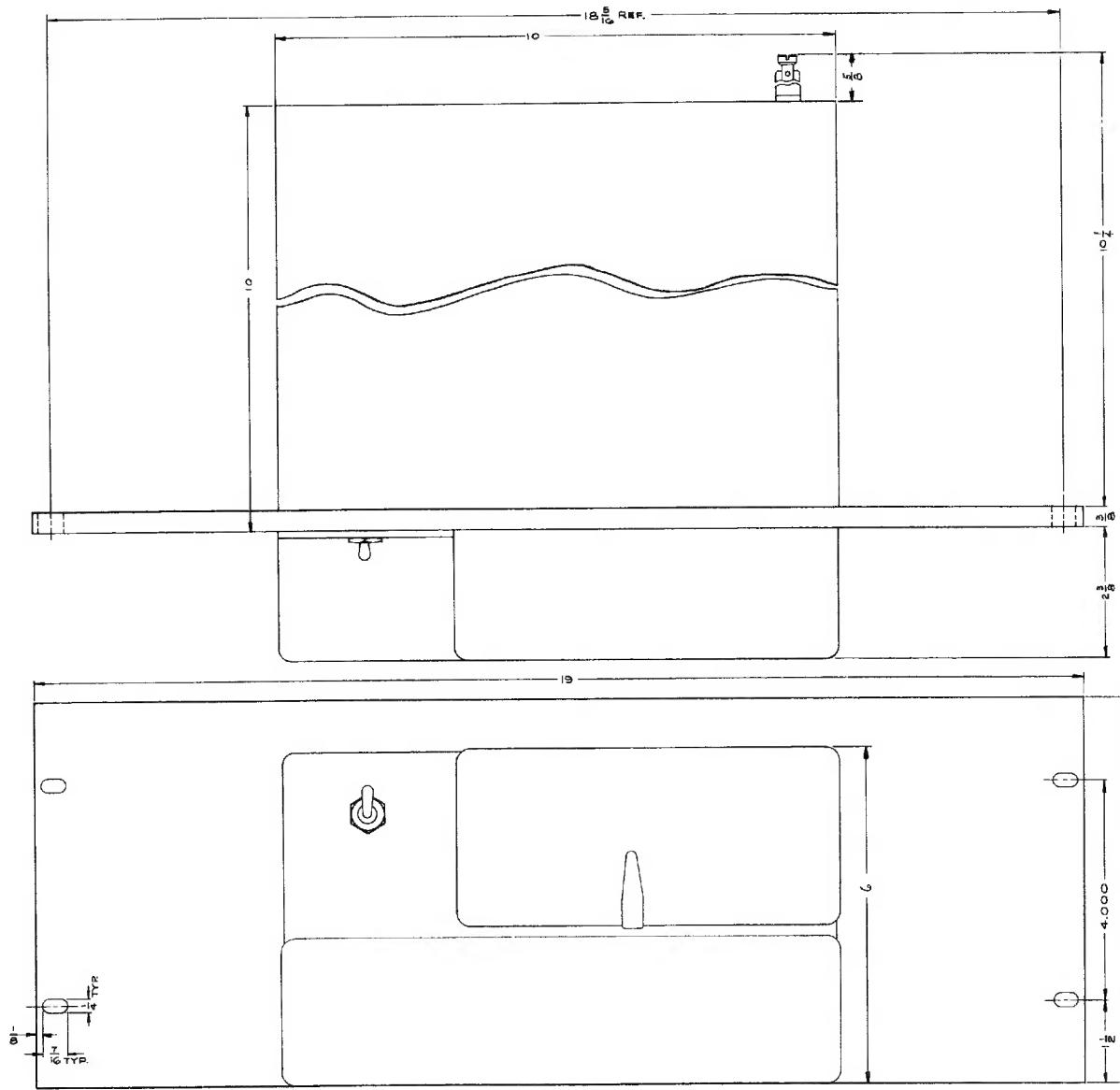
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A black and white photograph of the front cover of a vintage catalog. The title 'DIGITRONICS' is at the top in a large, bold, sans-serif font. Below it, 'ECONOMY READER' is written in a slightly smaller font. Underneath that, 'FIGURE 1-1 OUTLINE DRAWING' is printed. At the bottom, there is a small 'USED ONE' label and a large '100%' label. On the right side, there is a 'SEARCHED NO.' label with 'D-A 2741' handwritten next to it.

SECTION I

INTRODUCTION

1.1 SCOPE OF THIS SECTION

This section defines the purpose of the equipment, describes the applications of the equipment, lists the specifications and gives a physical description of the equipment. This section also lists the accessories supplied, and the associated equipment.

1.2 PURPOSE OF THE EQUIPMENT

The DIGITRONICS Model 2500 Unidirectional Perforated Tape Reader is designed to read up to 8 channel perforated tape at speeds of 100 characters per second, 300 characters per second, or step at speeds up to the slew speed.

1.3 APPLICATIONS OF THE EQUIPMENT

The applications include input equipment for numerically controlled machine tools, missile checkout devices, and lower speed inputs to digital instrumentation.

1.4 SPECIFICATIONS

The following are specifications for the Model 2500.

1.4.1 Power Requirements

- 1) AC power input, 105V-125V, 60cps, single phase, 125 watts.
- 2) Voltage available to energize relays in tape handler -15 volts. This voltage is available from pin "Z" on the input output connector. Pin "AA" ties this voltage through the load resistors, and the pinch roller and brake coils to 0 volts.
- 3) The maximum current available through Pin "Z" during rewind is 600 ma.
- 4) The following additional information is supplied for customer use:
 - a) Surge current at 125V RMS - 10 amps peak to peak.
 - b) Average power - 125 watts.

1.4.2 Start-Stop Controls

1) DC Mode

DC level input - One line input - 6 volts (tolerance: -5V to -16V) at 2.5 ma for RUN and 0 volts (tolerance: ± 0.5V) at 0.5 ma for STOP.

2) Pulsed Mode

Pulsed Input - In this mode of operation the reader will self-initiate a STOP command upon seeing the next sprocket hole. To go into this mode two pins on the output connector must be shorted together. The reader will step to the next character when a six volt pulse 0V to -6V with a minimum duration of 5 microseconds is applied to the input/output connector (0V to -6V-Negative going edge accomplishes triggering. Tolerance on -6V is from -5V to -16V. Tolerance on 0V is ± 0.5 V.). For the reader to stop on the next character the input line must return to 0V before seeing the leading edge of the next sprocket hole.

3) DC Input in Pulsed Mode

When a -6V DC level is applied at the input and the two pins for the pulsed mode are shorted at the connector, the unit will RUN for the duration of the DC level at the input. When the -6V DC level returns to 0 volts the reader will STOP on the leading edge of the next sprocket hole.

1.4.3 Output Signals

Built-in sprocket gated transistor amplifiers permit driving external circuits directly at the following levels:

Hole Condition : -10 volts ± 0.5 volts at 5 ma.
No-hole Condition : 0 volts ± 0.5 volts at 8 ma.

Note: Amplifiers may be ungated by not connecting jumper on input/output connector (Ref. Figure 2-4)

1.4.4 Mechanical Characteristics

1) Mounting

- a) Rack Adapter is for standard 19" relay rack.
- b) Desk Top - see dimensions.

2) Dimensions (Refer to Outline Drawing Fig. 1-1 and Mounting Options)

a) Stock Unit

Width of Front Panel: 10"

Thickness of Front Panel: 1/8"

Depth behind Front Panel: 10 5/8"

Height of Components behind Front Panel: 6"

Width of Components behind Front Panel: 10"

Height of Front Panel: 2 3/8"

Extension in Front of Panel: 2 3/8"

Weight: Approximately 15 pounds

- b) Rack Mount Adapter
 - Width of adapter: 19"
 - Height of adapter: 7"
 - Thickness of adapter: 3/8"
 - Depth of components behind adapter: 10 1/4"
 - Weight: 5 pounds
 - This rack mount adapter with standard holes will accommodate #10 screws spaced to fit a RETMA rack.

- c) Case Mount Adapter
 - Width of adapter: 10"
 - Height of adapter: 6 7/16"
 - Depth of adapter behind front panel: 10"
 - Height of rubber feet for adapter: 7/16"
 - Weight: 3 pounds.

1.4.5 Tape Characteristics

- 1) Tape Width Selector - Variable three position in-out action. Standard 5, 6, 7 or 8 level tapes (tapes include sprocket channel) may be used interchangeably.
- 2) In-line loading - 3 inches of leader required. Rotating Tape Width Selector clockwise permits loading of tape without removing power.
- 3) Type of Tape - Paper or Mylar tape, .004 to .005 in, thickness. Tapes with up to 40% transmissivity are acceptable. Can be adjusted to operate with tapes from .0025 to .008 in. thickness.
- 4) Type of Read - Unidirectional.
- 5) Speeds - Single speed units at 100 or 300 characters per second. Speeds other than 100 and 300 characters per second available as options.
- 6) Stop Distance - Stops on Stop character at both speeds.
- 7) Pinch Roller Operate Time: Less than 3 milliseconds.
- 8) Start Time: For the start time or time to the first character, add pinch roller operate time to the time it takes to read one character at the slew speed, then multiply by the appropriate friction factor as shown on the following page:

TABLE 1-1 COEFFICIENT OF FRICTION FOR PERFORATED TAPE

TYPE OF PAPER	FRICTION FACTOR
Dry Paper	1.1 - 1.3
Oiled Paper	1.3 - 1.5
Mylar (aluminized or solid)	1.5 - 4.0
Paper/Mylar/Paper	1.1 - 1.3

Above factors are approximate since the coefficient of friction varies from sample to sample.

1.4.6 Drive Motor Specifications

3600 RPM, Synchronous
Wound Stator
115 VAC, 60cps, 45 watts
Barber Colman Co.
Hi/Lo Temperature Lubricant ANDROL L456 (Reorder by Digitronics P/N TA-BD0002)

1.5 ACCESSORIES SUPPLIED

a) Connecotrs - Mating connector provided for signal and control - U.S. COMPONENT type UPCC - F2 HSL - 23 (Reorder by Digitronics P/N TPES02302).

b) Line cord for AC power - three wire type BIRNBACH #347, eight feet. long (Reorder by Digitronics P/N TLCMB0002).

1.6 ASSOCIATED EQUIPMENT

The Model 2500 reader will operate at 100 or 300 char/sec. with any of the following perforated tape handlers:

1) Model 4566ALCR Bidirectional Tape Handler - unit equipped with unidirectional high speed 100 inches/second rewind. Unit will handle 8" NAB reels (8" NAB reels 650' of 4.5 mil tape or 1000' of 2.5 mil tape).

2) Model 6070 Bidirectional Tape Handler - unit equipped with bidirectional high speed 140 inches/second rewind. Unit will handle either 8" or 10 1/2" NAB reels. (10 1/2" NAB reel will handle either 1200' of 4.5 mil tape or 1200' of 2.5 mil tape).

3) Model 6071 Bidirectional Tape Handler - unit equipped with unidirectional reel to reel rewind. Rewind speed is 160 inches/sec. During rewind, tape is transferred from the lower reel to the upper reel. Unit will handle either 8" or 10 1/2" NAB reels.

SECTION II

INSTALLATION

2.1 SCOPE OF THIS SECTION

This section describes the procedures required for the proper mechanical and electrical installation of the equipment. Initial installation checks are also given in this section.

2.2 UNPACKAGING

The DIGITRONICS Model 2500 Perforated Tape Reader is shipped in a reinforced packing case designed to provide maximum protection during handling and transportation. These cases are reuseable and should be retained if reshipment is anticipated. Care should be exercised in packaging to insure no damage occurs during this process. A visual inspection of all parts of the equipment should be performed to verify that the unit sustained no damage in transit. This check may avoid costly down time after installation. Should this inspection result in the discovery of damage, the carrier and Digitronics Corporation should be notified at once.

2.3 MECHANICAL INSTALLATION

2.3.1 Desk Mounting - When the unit is desk mounted no mechanical installation is required.

2.3.2 Rack Mounting - When the unit is rack mounted a special adapter plate is fitted to the unit so that the only requirement is that the unit be mounted in the rack.

2.3.3 Ventillation - Cooling is provided by a fan which blows cool air across the components.

2.4 ELECTRICAL INSTALLATION

A special mating connector is provided which must be wired to the external equipment to provide the necessary signals to operate the unit. Refer to figure 2-4 for proper wiring of Input/Output connector.

- 1) Install wired connector.
- 2) Apply AC power by inserting the line cord into 115V \pm 10V AC power source.
- 3) Insert a loop of tape with all channels punched.

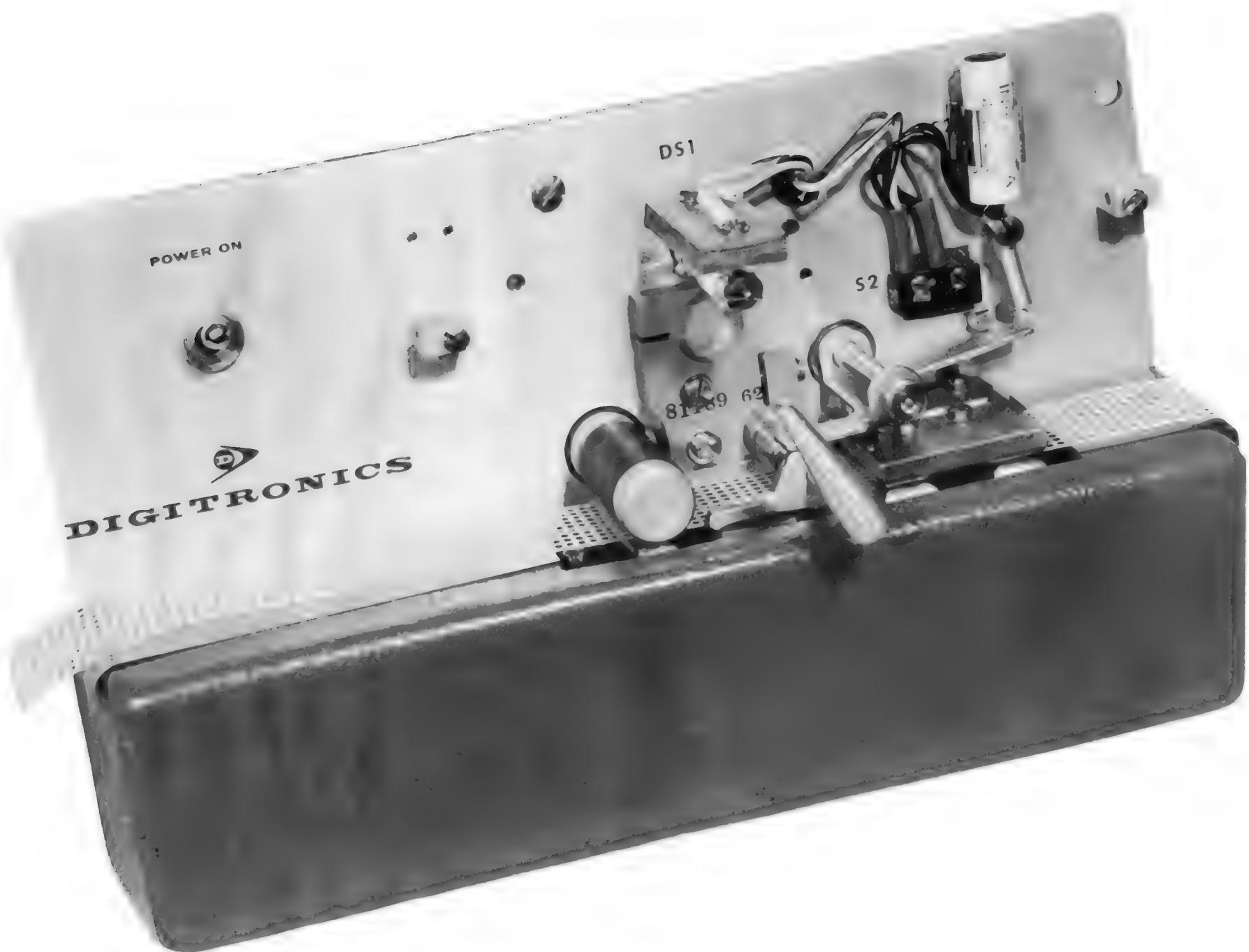
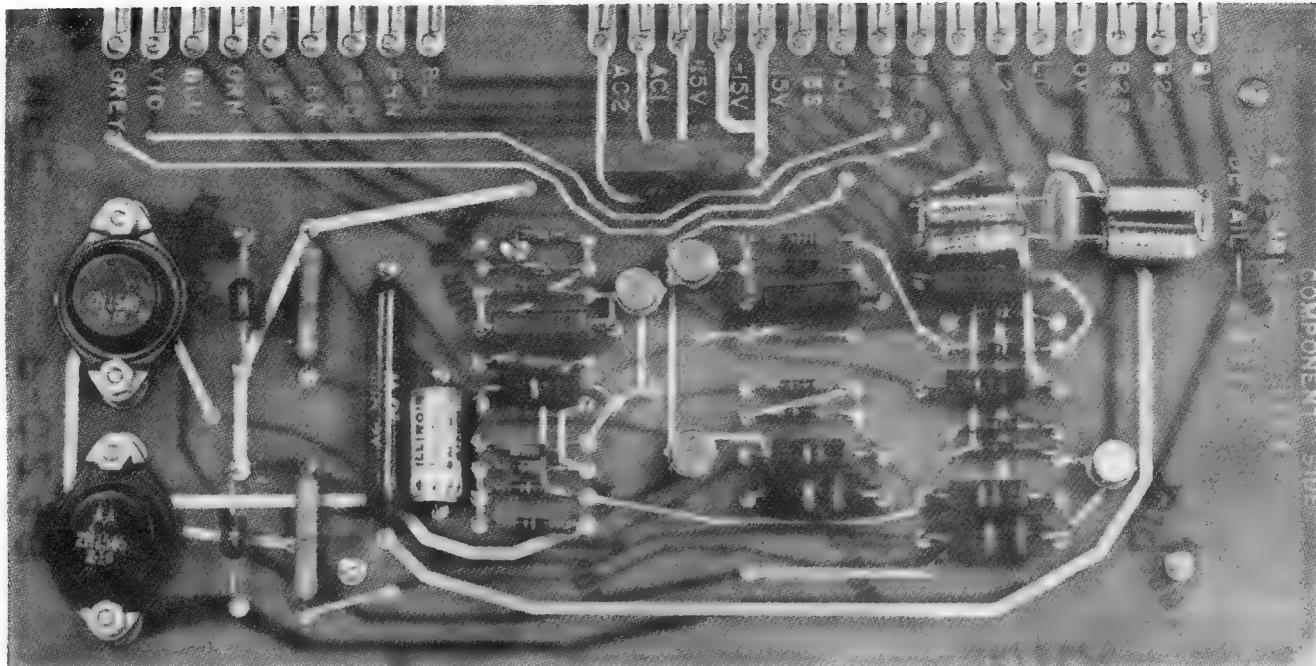
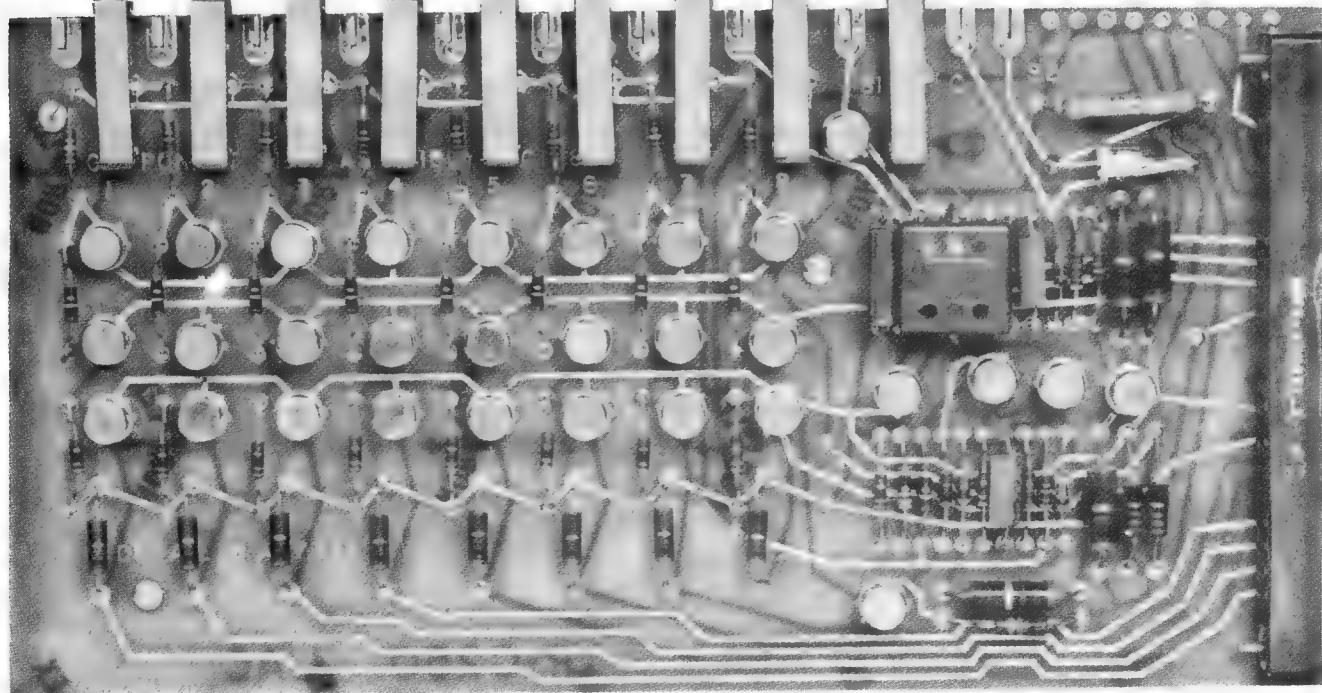


FIGURE 2-1 TAPE PATH



CIRCUIT CARD MPC

CHANNEL-1 ADJUST CHANNEL-3 ADJUST CHANNEL-5 ADJUST CHANNEL-7 ADJUST SPROCKET CHANNEL ADJUST



CIRCUIT CARD LAC

FIGURE 2-2 ADJUSTMENT LOCATION

4) If unit is to operate with a tape handler Models 4566ALCR or Model 6015 wire -15S to TB1-4 on the tape handler and -15L to TB1-5. See Fig. 2-4 and Section III.

5) If unit is operated without a tape handler -15L must be shorted to -15S on the input/output connector. Without this jumper, the reader will not slew tape and the brake coil will not energize.

2.5 ELECTRICAL INSTALLATION CHECKOUT PROCEDURES

The electrical installation procedures provide an effective means for checking the dynamics of the reader. These procedures provide checks for the data channel amplifiers, sprocket channel amplifier, and motion control circuitry.

2.5.1 Power Supply Voltages

Before performing checks of the logic amplifiers it is necessary that the -15 volt line from Pin "R" and the +15 volt line from Pin "U" to the 0 volt reference as taken from Pin "K" be checked. The tolerance on these lines are as follows:

- 1) -15 volts \pm 1 volt
- 2) +15 volts \pm 1 volt

2.5.2 Sprocket Channel Output Check

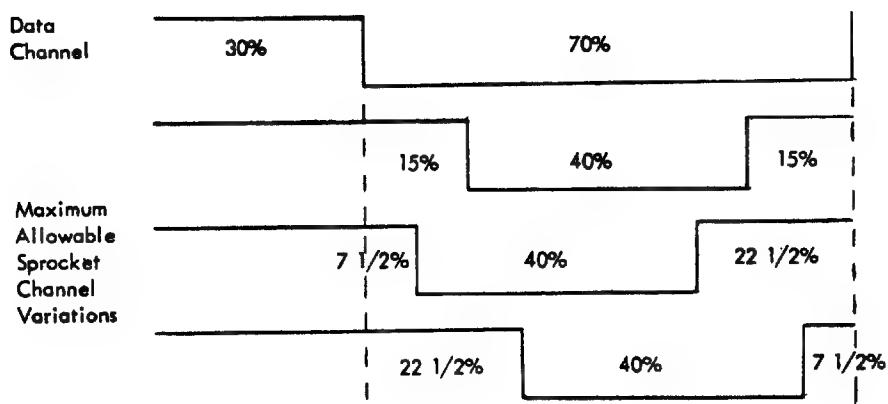
The sprocket channel output "PSP" may be taken from the output pin "V" on the input/output connector.

- 1) Apply a "RUN" signal to the reader. (Reference paragraph 1.4.2 and Figure 2-4).
- 2) With the tape in motion, apply the "PSP" signal to an oscilloscope.
- 3) Adjust the scope for 10 divisions equal to one cycle of the sprocket signal.
- 4) Check that the sprocket signal is 40% negative and 60% 0 volts. If adjustment is required, the potentiometer for the sprocket adjustment is located between S1 and S2 on card LAC.

2.5.3 Data Channel Output Check

For the location of each data channel output to the output connector see Figure 2-4, and 2-2. The adjustments are located on card LAC. The pots are numbered 1 through 8 to correspond to the data channel they represent.

NEGATIVE OUTPUT



POSITIVE OUTPUT

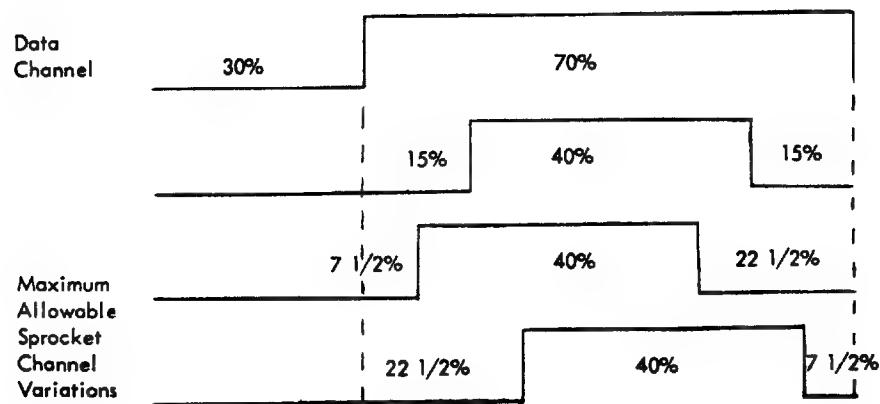


FIGURE 2-3 MAXIMUM ALLOWABLE SPROCKET CHANNEL TO DATA CHANNEL SHIFT

Gated or Ungated Outputs

In order to check the data channel outputs the unit must operate ungated.

- a) Assure the reader is operating ungated by checking that Pin "S" is not shorted to Pin "T" on the output connector.
- b) Apply an external "RUN" signal to start tape.
- c) Set the scope that 10 divisions equal one cycle of data channel output hole/no-hole information.
- d) Check that each data channel has an output 70% negative and 30% 0 volts.
- e) If the output is out of adjustment, correct the pot associated to that data channel to return the 70/30 condition.

2.5.4 Use of Neutral Density Filter

The neutral density filter may be used as an alternate method for checking the adjustment of the photodiodes. This filter has a neutral density of 50%. This means that only 50% of the light available from the lamp will be passed through this filter. This 50% ND filter is available from Digitronics Corp. The part number for this filter is AA4559. The following is the adjustment procedure for the photodiodes to be used with the ND filter.

- 1) Assure that AC power is applied to the unit. With AC power applied to the unit and the POWER switch is "ON", the lamp will light and the capstan will rotate.
- 2) Assure the jumper is installed between pins "AA" and "Z" and the "READY LOAD" switch is in the "READY" position (fully counterclockwise).
- 3) Insert the 50% ND filter over the photodiodes. No tape is required for this portion of the adjustment.
- 4) Check that the lamp voltage to the bulb is $8.2 \pm 0.5V$.
- 5) Attach a DC voltmeter, oscilloscope or equivalent to the output of the data channel (or sprocket) to be adjusted. The output may be taken either from the collector of the output transistor or from the pin on the input/output connector of the channel to be tested.
- 6) Adjust all amplifier pots until they switch to 0 volts.
- 7) Then individually readjust each amplifier until it is just switched to -15 volts. Care should be taken to seek out this point as accurately as possible. That is, do not adjust the pot too far into the "OFF" condition since this will result in a loss of sensitivity.

As an added check, remove the ND filter and insert a loop of tape with all holes punched. With a oscilloscope check and record the duty cycle of each channel. The duty cycle need not conform to the 60/40 or 70/30 relationship described in paragraphs 2.5.2 and 2.5.3. Do not change the adjustments performed above if the duty cycle for the channels do not conform it is no longer necessary to maintain these relationships.

2.5.5 Motion Control Circuitry Check - DC Mode

To check the motion control circuitry apply RUN and STOP commands in accordance with paragraph 1.4.2 to the RUN/STOP input Pin "Y".

1) The RUN signal, as applied to Pin "Y", should initiate tape motion within 5 to 9 milliseconds after receipt of RUN command (dependent upon the tape used) and slew tape at the slew speed.

2) The STOP signal, as applied to Pin "Y", should initiate the tape stop within 300 to 600 microseconds after receipt of the STOP command.

2.5.6 Motion Control Circuitry - DC Mode (pulsed Option)

When SA1 is shorted to SA2 as described in Section III, and a -6 volt RUN level is applied to the RUN/STOP input, the reader will slew tape at the slew speed until all of the following conditions are met. When they occur tape will stop.

1) The RUN/STOP input must return to 0 volts.

2) The leading edge of the next sprocket hole appears over the photodiode.

3) Note that if the input line returns to 0 volts during sprocket hole "ON" time, the reader will continue to run until the photodiode recognizes the leading edge of the next sprocket hole.

2.5.7 Motion Control Circuitry Check - Stepping Mode

When SA1 is shorted to SA2 as described in Section III and a -6V pulse train is applied to the RUN/STOP input the reader will step character-by-character at the stepping rate of the pulse train. There are two types of stepping modes "Open Loop" mode and "Closed Loop" mode. The maximum stepping rate in the "Open Loop" mode is 60 steps per second. The maximum stepping rate in the "Closed Loop" mode is the slew speed of the reader. For a more detailed description for these modes of operation, see THEORY OF OPERATION, Section IV, Paragraph 4.10.

In actual operation in both modes the unit will step to the next character and self-initiate a STOP command when 1) the sprocket photodiode reads a hole and 2) the input control line is at 0 volts. Note that the input control line must be at 0 volts prior to the recognition of the leading edge of the sprocket hole, if not, the reader will continue to slew tape until both conditions are present.

<u>PIN #</u>	<u>SIGNAL</u>	<u>DESCRIPTION</u>
o A	PD-1	Data Channel Output
o B	PD-2	Data Channel Output
o C	PD-3	Data Channel Output
o D	PD-4	Data Channel Output
o E	PD-5	Data Channel Output
o F	PD-6	Data Channel Output
o H	PD-7	Data Channel Output
o J	PD-8	Data Channel Output
o K	0V	
o L		
o M		
o N		
o P		
o R	-15V+1V	
o---*	S G1 -	(Gated or Ungated Data Channel Amplifiers)
o---*	T G2	
o	U +15V+1V	
o	V PSP	Sprocket Channel Output
o---*	W SA1	(For Stepping or Stop on sprocket—jumper "W" and "X" and apply a pulse train or DC level to the RUN/STOP input)
o---*	X SA2	
o Y	RUN/STOP	FORWARD direction (Slewing)
o---*	Z -15S	(Load switch - allows tape to be inserted without removal of power from the unit)
o---*	AA -15L	
NOTE: P2, the input/output connector should be wired to this configuration. When any or all of the option outlined in Table 3-2 are required, connect the pins associated with the option at the connector or through external switches.		
*NOTE: Connect a jumper (s) or switch (s) between the pins connected by dashes to accomplish the option (s) required.		
FIGURE 2-4 INPUT/OUTPUT CONNECTOR		

SECTION III

OPERATION

3.1 SCOPE OF THIS SECTION

This section describes the operating controls and the input-output connector. Also in this section is a suggested procedure for operating the unit.

3.2 OPERATING CONTROLS

TABLE 3-1 OPERATING CONTROLS

CONTROLS	FUNCTION
1. POWER ON Switch	Applies AC power to the power supply, capstan drive motor, and fan motor.
2. READY/LOAD Switch and Tape Width Selector Knob	The load switch de-energizes the brake and pinch roller to allow for tape insertion. The knob also moves in and out to handle different tape levels.

TABLE 3-2 READER OPTIONS AVAILABLE

OPERATION	OPTIONS
CONNECT PIN	<u>Gated Outputs</u> These pins may be wired to an external switch. Note the unit must be ungated for data channel adjustment, do not short these wires at the connector without this consideration.
1. G1 "S" G2 "T"	<u>Step On Every Character</u> These pins may be shorted at the connector or wired to an external switch.
2. SA1 "W" SA2 "X"	<u>Load Switch and Tape Rewind</u> These pins must be shorted at the connector to permit operation of Model 2500, and to allow tape to be inserted or removed without turning off power. These pins will also provide high speed <u>rewind</u> when through the Models 4566ALCR or Model 6015 Tape Handler when TB1-4 is connected to -15S and TB1-5 is connected to -15L.

3.3

OPERATING PROCEDURES

Assure that external control is attached to the unit.

1) Operate POWER switch to ON.

2) Select operating mode.

3) Load Tape. (Assure the READ/LOAD switch is fully counterclockwise and Pins "AA" and "Z" are shorted on input/output connector.

4) Apply desired input (pulsed or DC) to the unit.

3.4

STEPPING MODES OF OPERATION

There are two basic stepping modes of operation, which are arbitrarily called "open loop" operation and "closed loop" operation.

3.4.1

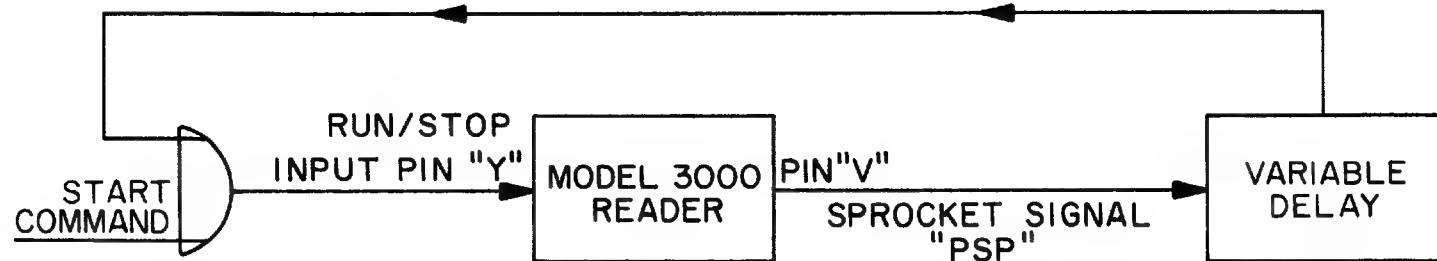
Open Loop Operation

In the "Open Loop" mode RUN signals are sent to the reader from a piece of equipment which may, in character, resemble a signal generator. The reader must be capable of starting up, slewing to the next character and stopping before the next RUN signal is applied. This is called "Open Loop" stepping because there is no tie back from the reader to the equipment which is generating the RUN signals. When using this type of system, the maximum stepping rate is 60 characters per second.

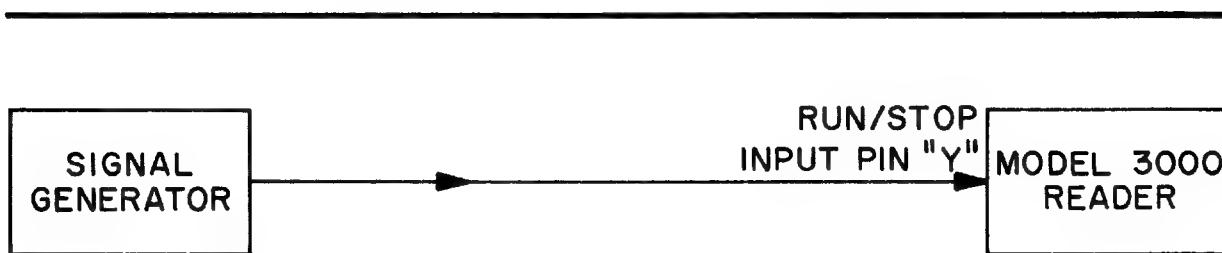
3.4.2

Closed Loop Operation

The "Closed Loop" mode is more often used. In this case, the reader is also given a RUN signal by the instrumentation utilizing the reader. The reader then proceeds to the next character. Upon seeing the leading edge of the next character the reader self-initiates a STOP. At the same time, the external instrumentation uses this edge to indicate that information is coming in and proceeds to process the information. The external instrumentation then generates another RUN signal some time later depending on how much time it took to process this information. Therefore, there is no limitation in stop to start time. Since there is no limitation from Start to Stop time, when operating in this mode, the reader is capable of stepping at any rate up to the slew speed.



Note: Stepping speed
of reader varies directly
with delay time.



OPEN LOOP BLOCK DIAGRAM

FIGURE 3-1 STEPPING MODES OF OPERATION

SECTION IV

THEORY OF OPERATION

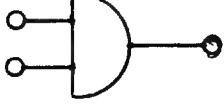
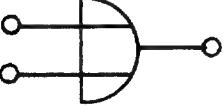
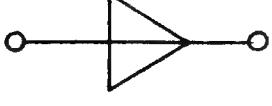
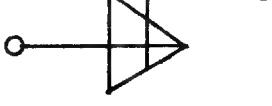
4.1 SCOPE OF THIS SECTION

This section describes symbol terminology, signal terminology, the relationship between the basic circuits through logic analysis and analyzes the circuitry comprising these circuits.

4.2 SYMBOL TERMINOLOGY

The symbols contained in the table below are used throughout Digitronics logic and may be used as a guide to understanding all Digitronics equipment.

TABLE 4-1 SYMBOL TERMINOLOGY

SYMBOL	NOMENCLATURE
	Gate or "AND" Gate
	Buffer or "OR" Gate
	Non-inverting Amplifier
	Inverter

4.3 SIGNAL TERMINOLOGY

4.3.1 Tape Read

Signal terminology consists of the terms logical "1" and "0" usually abbreviated "1" and "0" respectively. Logical "1" corresponds to hole time and logical "0" corresponds to no-hole time.

4.3.2 Tape Drive

For the tape drive system, logical "1" will represent a high level signal (-6 volts) and logical "0" will represent a low level signal (0 volts).

4.4 LOGICS DIAGRAM ANALYSIS

As shown in the logics block diagram in the back of this manual the unit consists of a Tape Read System and a Tape Drive System. Tape Read consists of a sprocket channel amplifier and eight data channel amplifiers. Tape Drive consists of start/stop circuitry necessary to activate the unit's brake and pinch roller solenoids. The power supply provides the necessary operating voltages.

4.5 TAPE DRIVE SYSTEM

The Tape Drive system contains a control section, a pinch roller section and a brake section.

4.5.1 Control Section - The control section is used to activate the unit's brake or pinch roller solenoids and hold them in operation for the desired period of time.

4.5.2 Brake Section - The brake section is essentially a logical inverter which activates the brake solenoid.

4.5.3 Pinch Roller Section - The pinch roller section is essentially a non-inverting amplifier which activates the pinch roller solenoid.

4.6 TAPE READ SYSTEM

The Tape Read System contains two main sections, the Sprocket Channel Section and the Data Channel Section.

4.6.1 Sprocket Channel Section

The sprocket channel is essentially an inverter which shapes a hole signal and makes it available for gating. The gating may be internal or external. Internal gating is accomplished by shorting G1 to G2. External gating may be accomplished by using the "PSP" signal available at pin "V" of the input/output connector.

4.6.2 Data Channel Section

The Data Channel amplifiers are non-inverting amplifiers designed so that the output signal may be gated with the sprocket signal or left ungated. Gating will minimize the effects of skew should it occur.

Turn to the back of this manual for schematics of the Power Supply, A-H634 "MPC" circuit card, (C-H617) and "LAC" circuit card (C-H619). In addition to the schematics, there is a Logics Block Diagram which shows both the Tape Read and Tape Drive Sections. The power supply has been de-centralized, that is, part of the power supply is mounted to the main chassis, part is located on the "MPC" circuit card, the rest is located on the "LAC" circuit card.

The power supply operates on 115V, single phase AC power and will draw 125 watts. The power supply provides all of the following voltages; +15 volts, -15 volts, -7.5 volts, -3.6 (photodiode bias) and an exciter lamp voltage of 8.2 volts.

AC power is applied through the line cord to the capstan motor, the fan motor, and the constant voltage transformer T1. Transformer T1 has one secondary which applies 35 V RMS to the full wave rectifier CR3. CR3 provides the -15 volt supply, the +15 volt and the exciter lamp supply through resistor R21 to R22. The exciter lamp is connected across L1 and L2 (see MPC card C-H617). The -7.5 volts is used as the collector supply in the emitter follower portion of the amplifier circuits. The -3.6 volt is used to supply bias for all photo diodes. Both the -7.5 volt and -3.6 volt are generated on the "LAC" card. (See C-H619).

The power transformer also contains a filter winding which in conjunction with a resonating capacitor, C1, is used to suppress fluctuations on the AC line.

The power supply portion of the schematic shows the layout of the brake and pinch roller solenoids. These solenoids are supplied -15 volts through -15L. -15L is part of a set of contacts available at the input/output connector which can be used to open the brake and pinch roller circuits externally without removing AC power from the unit. In order to slew tape or the brake to operate, -15L must be shorted -15S (Pin "AA" jumpered to "Z" on the input/output connector). The other side of the solenoids are connected to the heavy duty output transistors of the Pinch Roller Section and the Brake Section. These heavy duty transistors switch from 0 volts for enabling the solenoids, to -15 volts to disable the solenoids. Due to the nature of the Control Section logic, the solenoids are energized one at a time, that is, the pinch roller solenoid will not be enabled when the brake solenoid is enabled. The reverse is also true.

NOTE

This unit contains a floating ground. For signal levels or voltage measurements use 0 volts as taken from Pin "K" on the input/output connector.

4.9 TAPE DRIVE SYSTEM (See "MPC" Schematic CH617)

4.9.1 Control Section

The control section contains an inverter and two diode "OR" gates. The control section is used to determine tape motion.

4.9.2 RUN/STOP Input

The RUN/STOP input is a one line input from pin "Y" of the input/output connector that causes tape to either RUN or STOP.

Electrically, the switching time from a RUN condition to a STOP condition is approximately 2 usec. Mechanical switching time however, is much slower. From a complete STOP, full energization of the pinch roller coil is less than 3 milliseconds. When slewing tape at the maximum capstan speed (300 char/sec.) the time for tape to come to a complete STOP will be less than 600 usec. In the stepping mode of operation the time for stopping is greatly reduced. In addition, in the stepping mode, these stop and start times are the reason the unit can step at any rate up to the slew speed.

1) RUN - Tape will run when a -6 volt input signal is applied to the RUN/STOP input of the Control Section. The -6 volt signal is logical "1". When this is applied through the "OR" gate to inverter T1, T1 will produce a "0" output (a 0 volt signal). This output is applied to the Pinch Roller Section and through the second "OR" gate to the Brake Section. This set of signals will energize the pinch roller solenoid and de-energize the brake solenoid.

2) STOP - Tape will stop when a 0 volt input signal is applied to the RUN/STOP input of the Control Section. The 0 volt signal is logical "0". When this signal is applied through the "OR" gate to inverter T1, T1 will produce a "1" output. This output is applied to the Pinch Roller Section and through the second "OR" gate to the Brake Section. This set of signals will energize the brake solenoid and de-energize the pinch roller solenoid.

4.9.3 -15V (preset) Input

This input to the control section is internal to the unit and occurs only at initial power on. The purpose of this signal is to prevent unwanted tape RUN until the equipment comes up to operating speed.

4.9.4 Special Stepping Option

For the special stepping option, SA1 must be shorted to SA2 (Pin "W" to Pin "X" on input/output connector) and -6 volts must be applied to the RUN/STOP input.

1) When a -6 volt/5 usec pulse is applied to the input line, the leading edge of the next sprocket hole will apply a STOP command through T2, T3 and T5, to the Brake Section and through SA1 and SA2 to T1, T4 and T6 of the Pinch Roller Sections. When these pulses are applied as a "train", the reader will "step" character-by-character.

2) DC input in pulsed mode - When a -6 volt level is applied to the input line, the reader will slew tape at the slew speed. The reader will stop upon seeing the leading edge of the sprocket hole after the input line has returned to 0 volts. This can be used where the application calls for search for a certain character and then stop upon seeing the leading edge of the following character.

4.10 DETAILS ON STEPPING OPERATION (START/STOP WITH SA1 SHORTED TO SA2)

The purpose of the stepping function is to provide a self-initiated STOP command whenever the leading edge of the sprocket hole passes over the read head. The description below will cover further details of the operation and the control action used to perform either "Open Loop" or "Closed Loop" stepping.

To use this stepping option SA1 must be shorted to SA2 (Pin "W" to Pin "X" on the input/output connector) and pulses must be applied to the external RUN/STOP input (Pin "Y" on the input/output connector).

The reader will self-initiate a STOP command whenever it recognizes the leading edge of the sprocket hole (logical "1" "PSP" signal) and the RUN/STOP input is at 0 volts.

1) Signal "PSP" is derived from the sprocket hole and is available as an output through the input/output connector. During sprocket hole ON time, the "PSP" signal is logical "1". During sprocket hole OFF time the "PSP" signal is logical "0".

Signal "PSP" is also applied through a capacitor C2 a diode D5. This capacitor allows only the leading and trailing edges of the "PSP" signal to be transmitted through the inverter, T2, to SA1. With SA1 shorted to SA2 the inverted "PSP" signal is applied to an "OR" gate. The other leg of the "OR" gate is connected to the external RUN/STOP input from Pin "Y". The external RUN/STOP input will change from a -6 volt level (logical "1") for RUN to a 0 volt level (logical "0") for STOP.

Whenever either leg of the "OR" gate is at -6 volts the reader will RUN. But the reader will STOP only when both inputs of the "OR" gate are at 0 volts. With SA1 shorted to SA2, the SA2 input is at -6 volts during the sprocket signal no-hole time; as a result of a logical "0" (0 volts) "PSP" signal applied to the inverter T2. For this reason the reader will continue to RUN until it sees the leading edge of the next sprocket hole whether or not there is a 0 volt signal present at the external RUN/STOP input.

4.10.1 Pulsed Mode

When a START/STOP pulse from 0 volts to -6 volts with a minimum duration of 5 usec is applied to the RUN/STOP input, the reader will RUN as soon as the leading edge of the

input START/STOP pulse goes to -6 volts and will continue to RUN during the time that the START/STOP is at 0 volts. However, the unit will self-initiate a STOP only when the leading edge of the sprocket hole is recognized. This self-initiated STOP is the result of both the RUN/STOP signal and the SA2 leg being at 0 volts.

The number of 5 usec pulses applied externally to the RUN/STOP input will determine the stepping rate together with the mode of operation selected; "Open Loop" operation or "Closed Loop" operation.

There is no limitation if the externally generated pulses are derived from the sprocket signal as described previously. In this "Closed Loop Mode" the reader can step at any rate up to the slew speed.

4.10.2 Open Loop Operation

The maximum stepping rate is 60 characters/second when operating in the "Open Loop" Mode", that is when an external clock or timing device (such as a signal generator) that does not derive these 5 usec pulses from the sprocket signal, applies pulses to the external RUN/STOP input.

4.10.3 DC Input with SA1 Shorted to SA2

When a -6 volt level is applied to the external RUN/STOP input and SA1 shorted to SA2 the reader will drive tape at the slew speed. The reader will STOP upon seeing the leading edge of the next sprocket hole, but will not stop until the RUN/STOP input goes to 0 volts.

4.11 PINCH ROLLER SECTION

The pinch roller section contains two inverters. The first inverter T4 is a power driver which supplies the increased current to the base of the power amplifier T6. Power amplifier T6 swings from 0 volts when its on to -15 volts when it is off, and can handle the 1.5a dc current surge requirements of the pinch roller solenoid.

4.11.1 RUN- When the Control Section applies a RUN signal to the Pinch Roller Section the value of the input signal is 0 volts and may be considered logical "0". When this logical "0" signal is applied to the base of inverter T4 the output, logical "1", will be applied to the base of inverter T6. When inverter T6 receives a logical "1" input its output will be logical "0". Logical "0" will be 0 volts. This causes current to flow through the pinch roller solenoid. The pinch roller arm will then move up pressing the tape against the continuously rotating capstan and tape will RUN.

4.11.2 STOP- When the Control Section applies a STOP signal to the Pinch Roller Section the value of the input signal is -6 volts and may be considered a logical "1". When this logical "1" signal is applied to the base of inverter T4 the output, logical "0"

of T4 will be applied to the base of inverter T6. When inverter T6 receives a logical "0" input, its output will be logical "1". The value of logical "1" will be -15 volts due to the -15 volt input through -15L. This keeps 0 volts off the solenoid and holds it de-energized. The clamp diode prevents collector voltage from exceeding -15V, thus protecting the output transistor.

4.12 BRAKE SECTION

The brake section contains three inverters. The first is inverter T2; a standard transistor that performs a logical function only. The second inverter T3 is a power driver which supplies the increased current needed to drive the third inverter. Power amplifier T5 is the third inverter. This inverter swings from 0 volts when its conducting to -15 volts when its off and can handle the 1.5a dc current surge requirements of the brake solenoid.

4.12.1 RUN - When the Control Section applies a RUN signal to the Brake Section the value of the input signal is 0 volts and may be considered logical "0". When this logical "0" signal is applied to the base of inverter T2, the output logical "1" is applied to the base of inverter T3. Inverter T3 inverts this logical signal so that the output of the inverter is logical "0". The logical "0" is applied to the base of inverter T5 holding it off. The output of the inverter T5 is then logical "1". The value of the logical "1" will be -15 volts due to the -15 volt input through -15L. This keeps 0 volts off the solenoid and holds the solenoid de-energized. The clamp diode prevents collector voltage from exceeding -15V, thus protecting the output transistor.

4.12.2 STOP - When the Control Section applies a STOP signal to the Brake Section the value of the input signal is -6 volts and may be considered logical "1". When this logical "1" signal is applied to the base of inverter T2, the output logical "0" is applied to the base of inverter T3. Inverter T3 inverts this logical signal so that the output of the inverter is logical "1". This logical "1" signal is applied to the base of inverter T5 turning it on. The output is then logical "0". The value of logical "0" will be 0 volts. This causes current to flow through the brake solenoid coil which will press the armature against the tape, causing tape to STOP.

4.13 TAPE READ SECTION (See "LAC" Schematic C-H619)

4.13.1 Sprocket Channel Section

The sprocket channel section contains an emitter follower, two inverters and a Schmitt trigger. A sprocket hole is generated for every character that is read.

When the sprocket photodiode conducts during a hole condition, the positive signal produced by the photodiode is applied to the base of emitter follower (EF), T1. T1 couples this positive signal to the base of amplifier T2, resulting in a negative going collector potential. This signal is applied to the Schmitt trigger (ST) shaper transistors T3 and T4.

The negative going input to the base of T3 produces a positive going level at the

collector. The positive going voltage at the collector of T3 is coupled through a capacitor, C3, to the base of the emitter follower T4. Conduction in T4 decreases with the collector current being drawn through the emitter resistor R10 which is common to both T3 and T4. The decreased current through this emitter resistor results in a positive going change in the emitter potential of T3. The cumulative effect of any increasingly negative base potential and increasingly positive emitter potential, accelerates the increase in collector current of T3. The collector potential is thereby driven further positive, and is coupled through the input resistors to the base of transistor T4, with the result that conduction through input resistors to the base of transistor T4, with the result that conduction through T4 is further decreased. This positive feedback effect thus produces rapid turn-on of the first stage, while similarly abruptly driving the second stage into cut-off. The output of the Schmitt trigger is applied to G1 on the output connector Pin "S" and through inverter T5 to the "PSP" output Pin "V" on the output connector.

4.13.2 Gating Circuit and Operation of T6 (Gated or Ungated Output)

The gating option may be used by shorting pins "S" and "T" on the input/output connector. When this is done, the output from the Schmitt trigger is applied to the base of transistor T6 through G1 and G2 (Pins "S" and "T" on the input/output connector). The output at the collector of T6 is called PSPG. This point is tied to a diode D5, (TCRSUO125) in each of the data channel circuits.

When T6 receives the output of the Schmitt trigger through G1 and G2, the transistor turns off producing a -4 volt output at PSPG for the duration of the sprocket hole. During time between sprocket holes, the output at PSPG is +4 volts. During the ungated mode, the output at PSPG remains at -4 volts DC.

Zener diode, D4, supplies -3.6 volt regulated bias to the data channel photodiode through C. (See assembly drawing of LAC card D-C1784).

The +4 volt bias for the sprocket channel photodiode is supplied through S2 by a voltage divider network composed of resistors R18, R19, and R22.

The collector of the emitter follower T1 in all data channel circuits and the sprocket circuit, requires -7.5 volt level. This level is supplied by the voltage divider network composed of resistor R21 and zener diode CR5.

4.13.3 Data Channel Section

This unit contains 8 data channel amplifiers; each of these amplifiers is capable of producing -10 volts at 5ma into a 2K load for a hole condition and 0 volts for a no-hole condition. These 8 outputs are applied directly to the input/output connector, pins "A", "B", "C", "D", "E", "F", "H", and "J".

- 1) Ungated Mode - When any of the eight photodiodes reads a hole, it will conduct.

This conduction applies a negative signal through emitter follower T1 to the base of T2. Transistor T2 conducts when a negative signal is applied at its base. This occurs only during a hole condition.

Resistor R2 and diode D5 form an "AND" gate. In the ungated mode, diode D5 has applied to its anode a constant -4 volt level from PSPG, which allows the "AND" gate. This means that the negative level produced by the emitter follower T1 during a hole condition and applied through R2, will turn transistor R2 on.

When transistor T2 turns on, its collector applies a positive level to the base of T3, which then turns off. An output of -10 volts into a 2K load is then available at the input/output connector for the duration of the input hole signal. The hole signal is 70% of the distance from the leading edge of one data hole to the leading edge of the next data hole, therefore, the pulse width will be 70% for hole time and 30% for no/hole time.

2) Gated Mode - When any of the eight photodiodes reads a hole, it will conduct. This conduction applies a negative level through emitter follower T1 to the cathode of diode D5 and to the base of T2. In the gated mode, the input to the diode D5 from PSPG switches from a +4 volts for a no-hole condition to a -4 volts for a hole condition. Whenever the PSPG input is at +4 volts, the "AND" gate is blocked, which holds T2 off.

When transistor T2 turns on, its collector applies a positive level to the base of T3, which then turns off. An output of -10 volts into a 2K load is then available at the output connector for the duration of the combined sprocket and data signals. The sprocket hole, which generates PSPG through transistor T6, is smaller than the data hole and is centered within the data hole.

All data channel amplifiers receive the same PSPG signal, thus the sprocket hole will gate the data outputs. This assures that all data outputs will initiate and terminate at the same time. The sprocket hole is 40% of the distance from the leading edge of one sprocket to the leading edge of the next sprocket and centered within the data hole, therefore, the data channel output pulse width will be 40% for hole time and 60% for no/hole time.

SECTION V

MAINTENANCE

5.1 SCOPE OF THIS SECTION

This section describes the preventive maintenance, corrective maintenance, and adjustment procedures required to maintain the equipment in good operating condition. Access instructions are given first in order that the maintenance instructions may be performed.

5.2 ACCESS INSTRUCTIONS

5.2.1 Desk or Table Mounted

When the unit is desk mounted, a protective shield covers the components. This shield must be removed to gain access to the equipment. The protective cover is easily removed by unscrewing the two screws located on the front panel; the two screws which hold the cover to the back of the unit; and the four screws which are located in the rubber feet on the underside of the unit.

5.2.2 Rack Mounting

When the unit is rack mounted, no access instructions are necessary.

5.3 PREVENTIVE MAINTENANCE

For trouble-free operation, certain vital points should be inspected at periodic intervals, and the necessary replacements made when trouble is discovered. While this equipment has been designed for reliable operation, a certain amount of wear must be expected. If detected and corrected at an early stage, troubles from these causes can be minimized. Component Replacement Schedule Table 5-1 should be followed to assure maximum time between failure and to prolong troublefree use.

5.3.1 Periodic Inspection

An overall inspection of the equipment is recommended as a precautionary measure immediately before being put into service, and at intervals of six to nine months, thereafter. Such an inspection involves a complete examination of electrical wiring and mechanical details in addition to inspection of the output signals and the proper functioning of the operating controls. The inspection table which follows, was computed on the basis of a 40-hour week. When customer usage exceeds these limits, adjustments should be made to the table. If defects are evident during inspection period, i.e., capstan worn, etc; perform replacement procedures immediately.

TABLE 5-1

COMPONENT REPLACEMENT SCHEDULE

Item	Replace At
1. "O" Ring Belts	1. 1000 hrs. or 250 million start/stop operations
2. Light Bulbs	2. 1500 hrs.
3. Bearings, Capstan	3. 2000 hrs. or 500 million start/stop operations
4. Capstan	4. 2000 hrs.
5. Bearings, Pinch Roller	5. 2000 hrs. or 500 million start/stop operations
6. Pinch Solenoid	6. 3000 hrs. or 500 million start/stop operations
7. Motor, Capstan Drive	7. 4000 hrs.
8. Bearing, Pulley (Used on 100 cps, 150 cps, etc. Not used on 300 cps & 200 cps.)	8. 4000 hrs.
9. Brake Assembly	9. 5000 hrs.
10. Switch, load	10. 5000 hrs.

TABLE 5-2

PERIODIC INSPECTION

DAILY	MONTHLY	SEMI-ANNUALLY
1. Read Head 2. Tape Guide 3. Pinch Roller 4. Capstan 5. Brake Clean as required (Digitronics Cleaning Kit MS-133)	1. Pinch Roller/Capstan Gap (.001 to .002) 2. Belts in Drive Motor Assembly 3. Return Spring Locknut check (2-3 lbs. with solenoid energized). 4. Brake Armature resting squarely on coil. See paragraph 5.5.2.	1. All moving parts for wear 2. Data Channel outputs 3. Sprocket Channel output 4. Power Supply voltages

5.3.2 Routine Maintenance

(1) Lubrication — This unit requires no lubrication. All bearings are permanently lubricated and require no attention. Double shielded ball bearings are used throughout the tape transport system to prevent the entry of dust. When any of these bearings indicate any sign of sticking, it should be replaced.

(2) Cleaning — When inspection reveals that components of the unit require cleaning, the Digitronics Cleaning Kit (MS-133) provides a convenient brush and solvent. Alternatively, a cotton swab or lint-free cloth may be used with a solvent such as N-Amyl Alcohol.

5.4 CORRECTIVE MAINTENANCE

When properly installed and preventive maintenance is carried out, any irregularities that occur in the performance of the equipment will be attributed to the failure of some component part. Since the unit has been factory adjusted, the adjustment procedures should not be undertaken until after the corrective maintenance has proved ineffective or has resulted in the replacement of parts.

5.4.1 Tools Required

- (1) Oscilloscope Tektronix 545 or equivalent with dual trace option
- (2) Screw Driver
- (3) VTVM Sr. Volt Ohmyst (RCA) or equivalent
- (4) Feeler Gauge (.001 to .002 range)
- (5) Spring Scale (1 - 5 lb. range)
- (6) Allen Wrench Set

5.4.2 Trouble Shooting

When it is necessary to trouble shoot the equipment, locate the defective circuit or component by conventional trouble shooting techniques. The most obvious source of trouble and one of the most easily corrected is Data Channel Amplifiers and the Sprocket Channel Amplifier. Point-to-point voltage checks and resistance measurements, or comparing input and output waveforms of the various stages may be necessary to locate less apparent faults. The circuit cards are very easy to trouble shoot due to the location and placement of the various stages. Note that the eight data channels are numbered on the LAC card and that transistor T1 is closest to the variable pot for any of the eight channels with T2 and T3 successively being further from the potentiometer. See Figure D-C1784-1 (assembly drawing of LAC card) for the locations of each data channel amplifier and sprocket channel amplifier. Figure D-C2898 (assembly drawing of PDC card) shows the location of the brake section, pinch roller sections, and control section on the card. The power supply rectifier CR18 is also on this card. The schematics in the back of this manual show the components as they are laid out on the circuit boards in addition to giving circuit relationships.

For mechanical trouble shooting, check the Pinch Roller/Capstan Gap as described in paragraph 5.5.1 and refer to the Illustrated Parts Breakdown. Mechanical disassembly should be accomplished only in conjunction with the Illustrated Parts Breakdown. The IPB may also be used to order replacement parts.

5.5 ADJUSTMENT PROCEDURES

The adjustment procedures given in this section should be performed only after corrective maintenance has proven ineffective or has resulted in the replacement of parts. Adjust controls only if suitable equipment is available for complete realignment.

5.5.1 Pinch Roller Assembly (FORWARD & REVERSE - Refer to Figure 6-3)

The Pinch Roller Assembly has two adjustments; the return spring locknut adjustment and the pinch roller/capstan gap adjustment. The return spring adjustment should be performed first since it will affect the gap adjustment.

(1) Return Spring Locknut Adjustment

- a) Actuate the pinch roller solenoid by applying a -6 volt RUN signal to the input/output connector pin "Y" (Forward) or pin "P" (Reverse).
- b) Increase spring tension by tightening locknut until solenoid toggles to deactivated position.
- c) Back off locknut until solenoid armature returns to actuated position.
- d) Back off locknut an additional half turn.
- e) Check that force to unseat solenoid is 2-3 lbs.
- f) Check the other pinch roller using the above procedure.

(2) Pinch Roller/Capstan Gap Adjustment

- a) Remove "O" ring drive belts prior to applying power to unit.
- b) Apply power to unit. Apply a RUN signal to pin "Y" (Forward) or pin "P" (Reverse).
- c) Using a feeler gauge, check the gap between the pinch roller and the capstan. The gap should be between .002 - .001 inches, if not, continue with step d).

- d) Loosen the screws that hold the solenoid assembly to the panel.
- e) Adjust for a .002 - .001 inch gap and tighten screws.
- f) Check the other pinch roller using the above procedure.

5.5.2 Brake Assembly (Refer to Figure 6-4)

The Brake Assembly requires no special gap adjustment, however, the brake armature should rest squarely and evenly upon the poles of the coil assembly. Whenever the brake assembly or either pinch roller assembly is replaced, assure that the tape remains in a straight line from either pinch roller assembly through the Head Assembly and Brake Assembly. A good check for squareness for the Brake Assembly is to operate the Ready/Load switches to Load. Then, using some object, activate the micro switch. Apply a RUN signal to the reader. Tape should guide smoothly with the tape guide in the Load position. If not, replace brake spring using the Illustrated Parts Breakdown as a guide.

5.5.3 Head Assembly (Refer to Figure 6-5)

The Head Assembly is a factory-adjusted unit. Should the trouble shooting show that the problem is in the Head Assembly, perform the following adjustment procedure:

- (1) Assure that the lamp voltage between L2 and L1 is 8 volts, if not, adjust R22 to 8 volts.
- (2) When the lamp voltage is 8 volts, but the photodiode does not respond properly, rotate the exciter lamp until maximum light is applied to the photodiode. This will usually correct the irregularity.
- (3) Readjust Data Channel Amplifiers (ungated) to restore the 70/30 relationship in accordance with paragraph 2.5.1.
- (4) Readjust the sprocket channel for a 40/60 condition in accordance with paragraph 2.5.1.

If this procedure does not correct the irregularity, remove the photodiode assembly (Item 7, Figure 6-5) and ship to DIGITRONICS Corporation. Under no circumstances should the photodiodes be removed from the assembly.

5.5.4 Motor Assembly (Refer to Figure 6-6)

When the motor requires replacement, follow the Illustrated Parts Breakdown for assembly and disassembly procedures. The only check for the motor assembly that has been replaced is to assure that both capstans are equidistant from their respective pinch roller assemblies. This can be accomplished by eye.

LUBRICATE HERE
WITH ANDROL L456

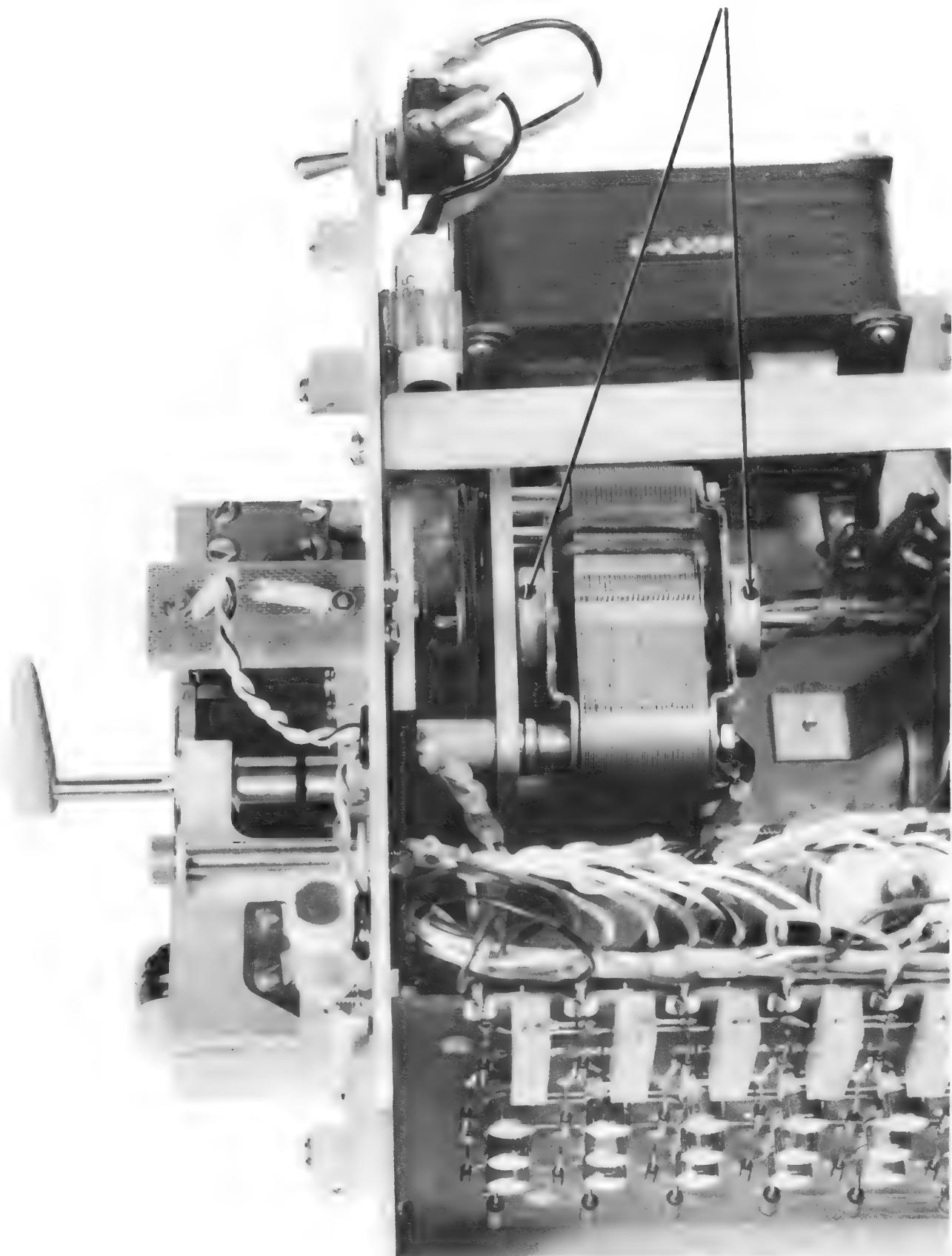


FIGURE 5-1 LUBRICATION POINTS

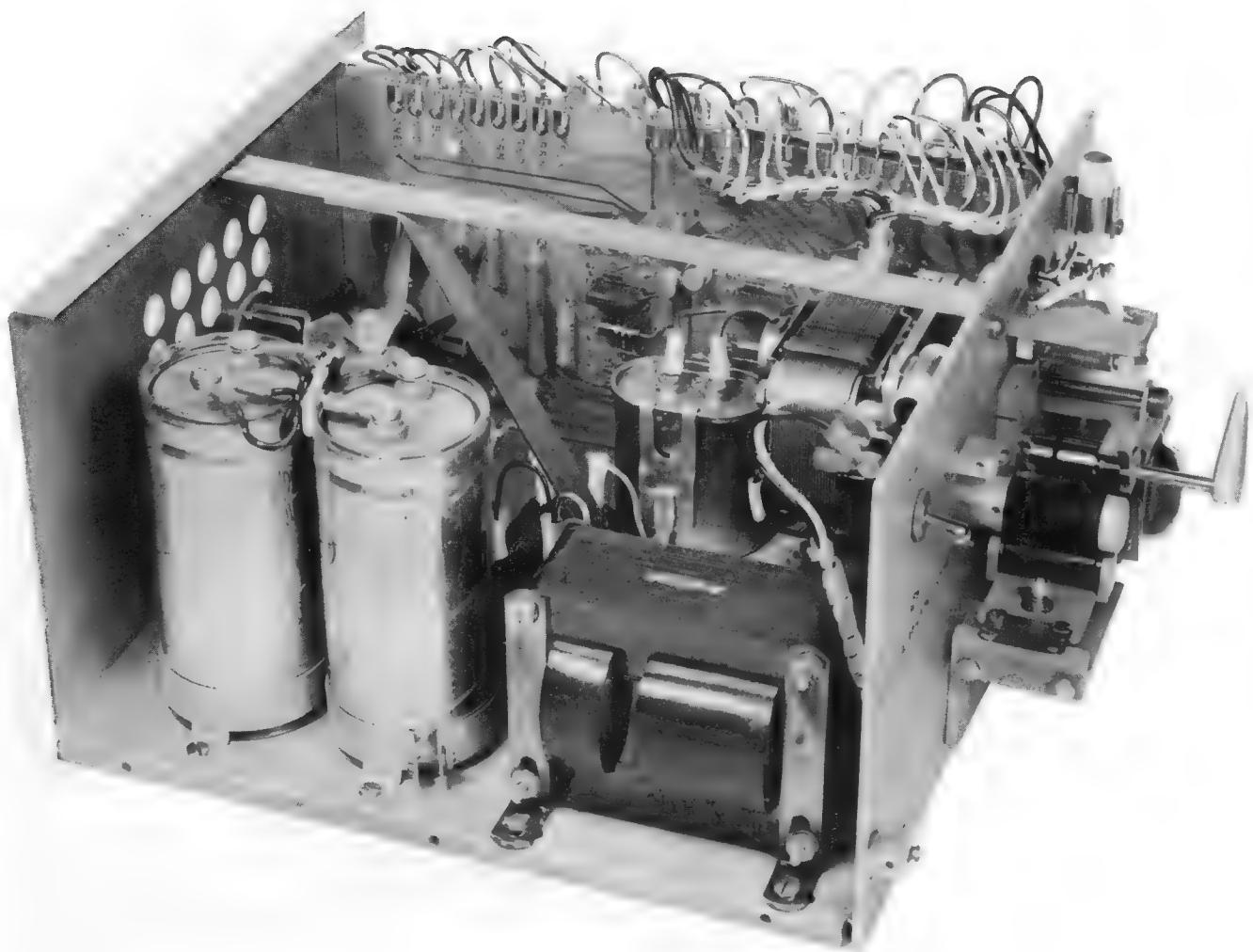


FIGURE 5-2

POWER SUPPLY COMPONENT LOCATION

INPUT/OUTPUT
CONNECTOR P2

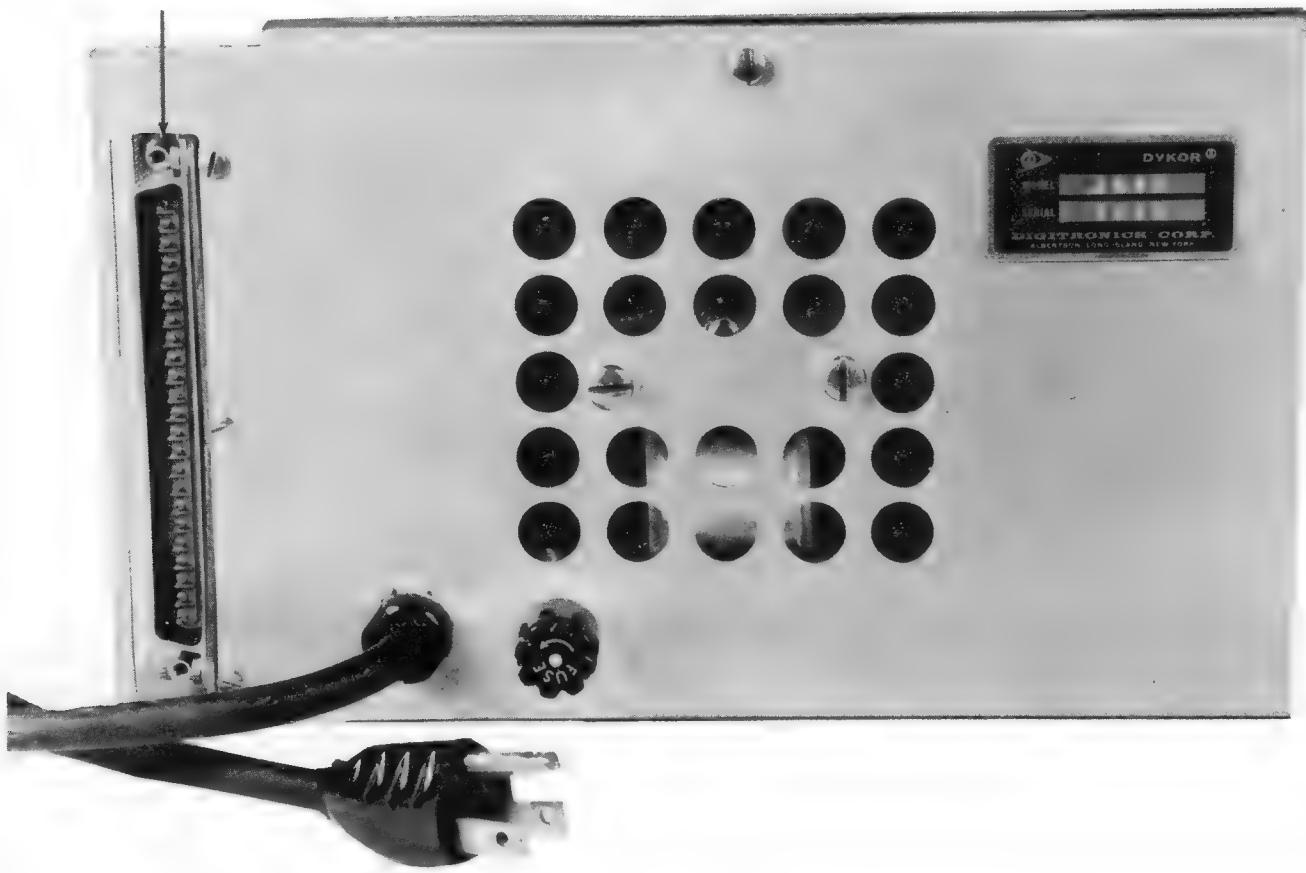
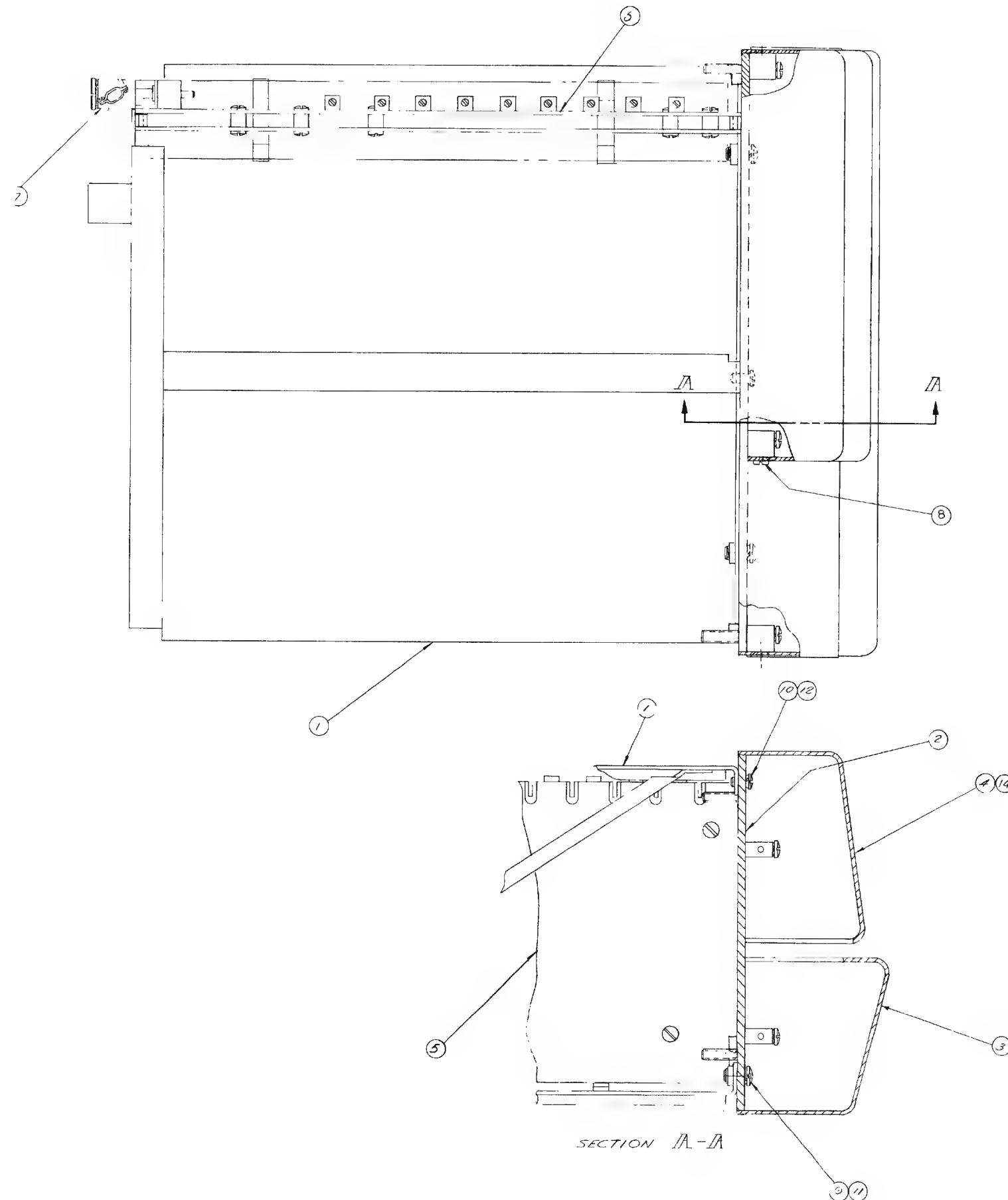


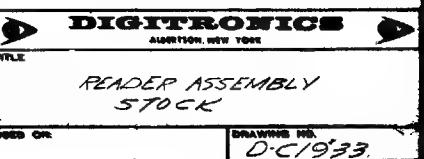
FIGURE 5-3 BACK VIEW MODEL 2500 SHOWING INPUT/OUTPUT CONNECTOR

D-C1933 K

DRAWING NO.		DESCRIPTION
DC1933		READER ASSEMBLY STOCK
QTY ITEM DRAWG NO. DESCRIPTION		
1	001	DC1035 ECONOMY READER ASSY
1	002	CC1932 FRONT PANEL ASSEMBLY
1	003	CC4002-1 LOWER COVER SPT. ASSY
1	004	BC4003-1 COVER ASSY UPPER
1	005	CC1930 PC PACKAGE ASSEMBLY
006		
1	007	TPES02302 CONN US COMP
4	008	TH-SD1203 SCR #8-32 x 3/8 BHM
2	009	TH-SI1405 SCR #8-32 x 5/16 BHM
1	010	TH-SI1204 SCR #8-32 x 5/16 BHM
2	011	TH-WB0706 LOCKWASHER #8
1	012	TH-WB0205 LOCKWASHER #6



K	ECO 4490	FB	9-30-64
H	U.D.P/L ECO4521	FB	8-28-64
G	DELETED DASH	E	9-1-64
F	ECO 4281 (L)	FB	3-9-64
E	ECO 4111	FB	11-19-63
D	UPDATED	DK	5-3-63
C	3490	FB	12-13-62
B	3215	R.H.	9-11-62
	2957	P	6-9-62



Q'TY	DESCRIPTION	PART NO	ITEM
1	PANEL, SCREENED	C-F28G	1
1	BAKE ASSY	B-C1142	2
1	SOLENOID MOUNT ASSY	C-C1924	3
1	LAMP ASSY	B-C461	4
1	LENS & HEAD ASSY. ITEM 5 MS185		5
1	SNAP BUSHING - HEYCO #5B250-2	TSBN02001	6
1	SNAP BUSHING - HEYCO #5B375-4	TSBN04003	7
1	SNAP BUSHING - HEYCO #5B500-6	TSBN06004	8
1	SWITCH, TOGGLE - CUTLER HAMMER #B258C7	TDC01AS18	9
4	BRACKET, COVER	A-A481G	10
1	LAMP	TLNEE0004	11
1	ACTUATOR, SWITCH	B-A2917	12
4	SCREW, B.H.M. #4-40X9/16 LG. (5-618)	TH-SI0808	13
2	SCREW, B.H.M. #6-32X 3/16 LG. (5-618)	TH-SI1205	14
2	SCREW, B.H.M. #6-32X 3/16 LG. (5-618)	TH-SI1205	15
2	SCREW, B.H.M. #4-40X 3/16 LG. (5-618)	TH-SI0805	16
2	SCREW, SOC. HD. CAP #8-32X 3/16 LG.	TH-SI1405	17
1	SCREW #6-32X 1/2 LG. B.H.M. (5-615)	TH-SI1207	18
2	WASHER, PLAIN #8 (5-602)	TH-WA0707	19
10	LOCK WASHER, SPLIT #4 (5-601)	TH-WB0405	20
1	MOTOR OPTION ASSY ^{SEE MS135} ITEM 3		21
5	LOCK WASHER, SPLIT #6 (5-601)	TH-WB0605	22
2	LOCK WASHER, SPLIT #8 (5-601)	TH-WB0808	23
2	SCREW, B.H.M. #2-56X 1/2 LG. (5-618)	TH-SI0307	24
1	CAP SCREW (MOD)	AA3883	25
1	SWITCH, UNIMAX	TDA01BS03	26
1	SPACER	AA4883	27
1	SPRING	A-A188	28
2	SPARK SUPPRESSOR	A-A278G	29
2	COMPONENT CLIP AVAGAT, COA-24	TCLAAD0003	30
4	SCREW #4-40X 3/16 LG. B.H.M.	TH-SI0802	31
1	INSULATOR	A-A3158	32
1	RESISTOR, ADJ. 10Ω 10W ^{SEE MS135} #1006	TEAF100D	33
1	SCREW #6-32X 2 1/2 LG. B.H.M.	TH-SI1239	34
2	FIBRE WASHER, GEN. CEM #6525M	TH-YD0609	35
1	NUT, HEX 6-32 (5-600)	TH-NA110G	36
2	WASHER, PLAIN #2	TH-WA0206	37
2	LOCK WASHER, SPLIT #2	TH-WB0201	38

C-C1932

POWER ON

DIGITRONICS

SEE MS135 - ITEM 3 (21)

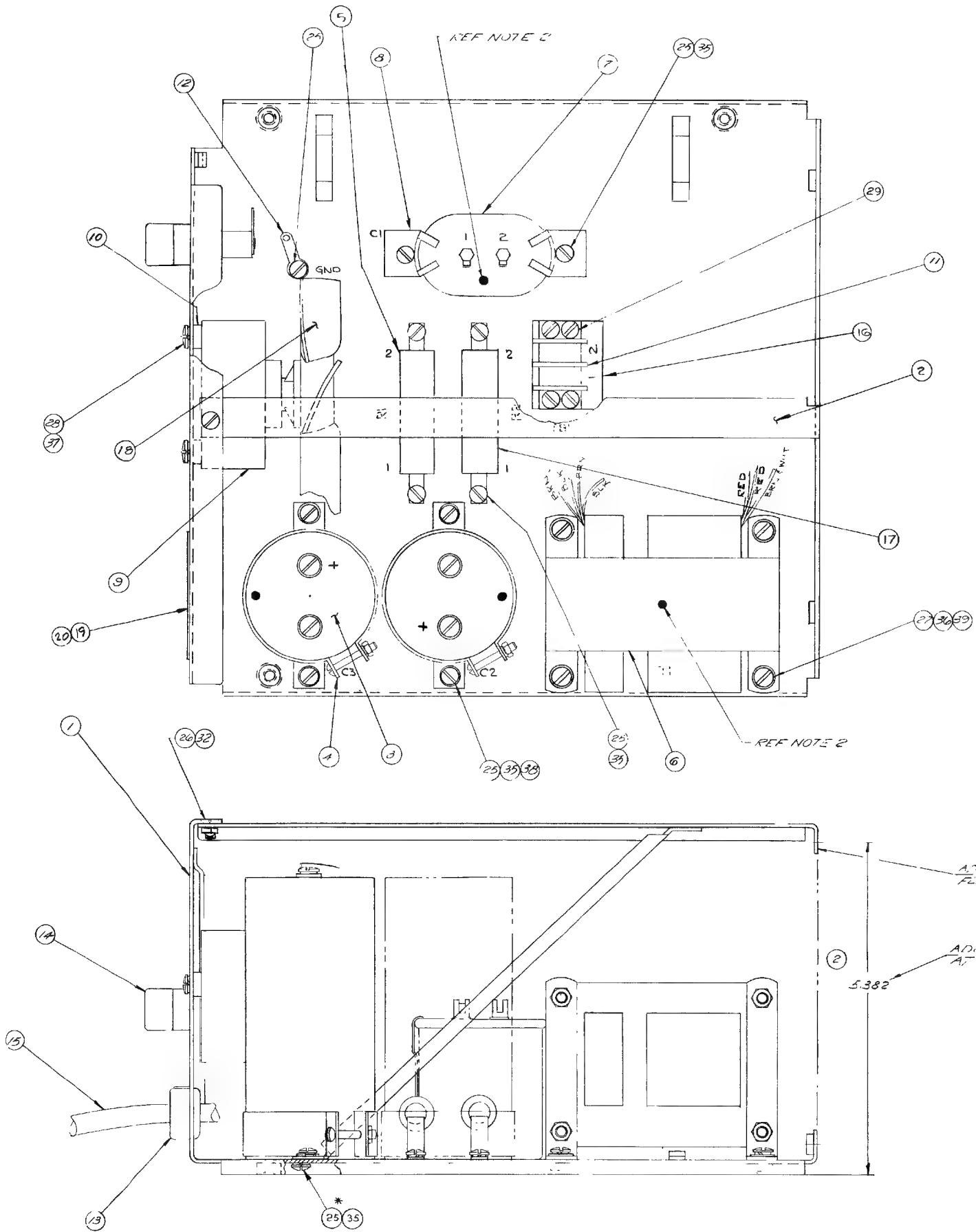
18 REF.

28 REF.

VIEW A-A

DIGITRONICS	
ALBERTSON, NEW YORK	
TITLE: FRONT PANEL ASSY.	
USED ON:	DRAWING NO. C-C1932

OPNG NO	DESCRIPTION
0 DC1035	ECONOMY READER ASSY
QTY ITEM DRNG NO	DESCRIPTION
1 001 DE287	CHASSIS MARKING
1 002 CC1986	BRACE ASSY
2 003 TC-EH109F	CAP 10000.410 25V
2 004 TMBC0005	MTG BLT DOME 1016 D19
1 005 TR-U1250C	25 OHMS 25W 0M110200C
1 006 BA2688	TRANSFORMER
1 007 HA2729	CAPACITOR
1 008 GH2904	MTG BLT CAPACITOR
1 009 TB1410001	BLOWER HOW #1075
2 010 GH2495-9	SPACER
1 011 TB4940502	TERM BD 600-2
1 012 TH-LA2006	#6 GND LUG INT LOCK
1 013 TSN00001	S.P. HEMAN SPPG.1
1 014 TCB50100	FUSE ALDP L.1532003
1 015 TLCM80002	LINE CORD BPNBACH 347
1 016 TMSA00102	MKP STA. PULKA 600-2
1 017 TR-U1200C	PCB 2012 25W
1 018 TBPPB0202	PLASTIC FAN BLADE
1 019 CA4899-1	PLATE, IDENT PHOTO
A/R 020 AT 132	ADHESIVE SPEC (EASTMAN 910)
021	
022	
023	
024	
12 025 TH-S1203	SCR 6-32 x 3/16 BH M
1 026 TH-S1204	SCR 6-32 x 5/16 FL. HD.
4 027 TH-S11404	SCR 8-32 x 5/16 BH M
2 028 TH-S11705	SCR 10-32 x 3/16 BH M
4 029 TH-S11205	SCR 6-32 x 3/8 BH M
030	
031	
1 032 TH-ZA1106	ESNA NUT #6-32
033	
034	
11 035 TH-WB0609	WASHER SPLIT #6
4 036 TH-WB0510	WASHER SPLIT #8
2 037 TH-WB1011	WASHER SPLIT #10
4 038 TH-WA0612	WASHER FLAT #6
4 039 TH-WA0812	WASHER FLAT #8
040 XXX	AEC
041 XXX	HARNESS ASSY



SECTION VI

ASSEMBLY DRAWINGS, ILLUSTRATED PARTS BREAKDOWN, AND SCHEMATICS

6.1 SCOPE OF THIS SECTION

This section contains - the assembly drawings which show front panel component assemblies as well as chassis component assemblies; the illustrated parts breakdown of the Brake Assembly, Pinch Roller Solenoid Assembly, and the Head Assembly; and schematics for the unit which incorporates an electrical parts list for both the "MPC" and "LAC" printed circuit cards.

6.2 ASSEMBLY DRAWINGS

The assembly drawings (front panel and chassis assembly) give the relationship of the components and list component assembly part numbers. The chassis assembly also lists chassis electrical parts both may be used for reordering purposes.

6.3 ILLUSTRATED PARTS BREAKDOWN

The illustrated parts breakdown lists sub-assemblies which may be reordered and may also be used to generate excellent assemblies or dis-assembly procedures.

The illustrated parts breakdown also contains two mounting options: case mount and rack mount. Both are illustrated in this section.

6.4 SCHEMATICS

The schematics for the unit are printed on the foldout pages for easy reference while reading the rest of the manual. On the inner portion of the foldout page is the assembly drawing for the schematic which lists all electrical parts on the schematic.

ILLUSTRATED PARTS BREAKDOWN

ITEM	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
6-3	C-C1924	PINCH ROLLER SOLENOID ASSEMBLY	1
1.	C-A2890	Mounting Bracket Solenoid	1
2.	A-A2900	Spring, Compression	1
3.	A-1078-2	Stud, Spring	1
4.	TH-ZA0905	Nut, Lock-Esna #79NM-50 (5-4ONC-3B (THD)	1
5.	TH-WA0612	Washer, #6 Flat S-604	1
6.	B-A2142	Block, Roller Mount	1
7.	A-A2144	Spring, Pinch Roller	1
8.	B-A2145	Bracket, Roller	1
9.	A-A2722	Roller, Tape	1
10.	A-A2224	Shaft, Roller	1
11.	TB-FF0006	Bearing, Flanged, New Hampshire SFR2-5PPEE	2
12.	TH-SC0801	Screw, #4-40 x 1/8 lg., Truss Hd. S-613	2
13.	TH-SC0803	Screw, #4-40 x 1/4 lg., Truss Hd. S-613	2
14.	TH-XB0901	Screw, #4-48 x 1/8, Set Cup Point	1
15.	TH-WB0403	Lockwasher, #4 Split	4
16.	A-1306	Button Striker	1
17.	TH-SC0807	Screw, #6-32 x 1/2 lg., Truss Hd. S-613	2
18.	TH-WB0605	Lockwasher, #6 Split S-601	2
19.	TH-NB0905	Nut, #5-40, Hex S-613	2
20.	TH-WB0504	Lockwasher, #5 Split S-613	2
21.	AB-73-1	Solenoid Assembly	1

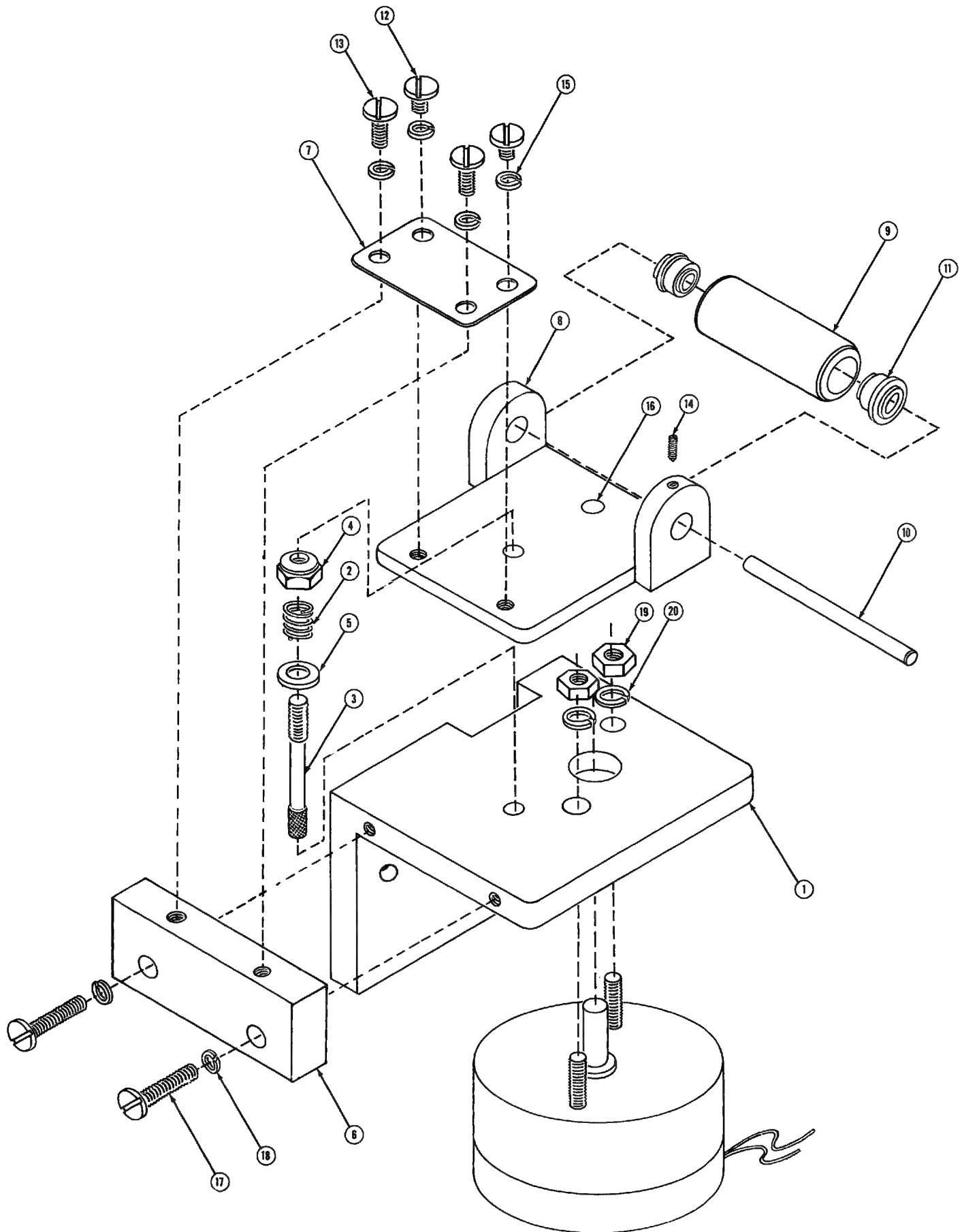


FIGURE 6-3 PINCH ROLLER SOLENOID ASSEMBLY

ILLUSTRATED PARTS BREAKDOWN

ITEM	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
6-4	B-C1142	BRAKE ASSEMBLY	1
1.	B-A2287	Base Plate	1
2.	B-C1143	Coil Assembly	1
3.	A-A2058	Armature	1
4.	A-A2905	Spring	1
5.	TH-WB0403	Lockwasher, #4 Split	4
6.	TH-SI0801	Screw, #4-40 x 1/8 lg., B.H.M.	4
7.	TH-SG1407	Screw, #8-32 x 1/2 lg., Flat Hd. Mach.	2

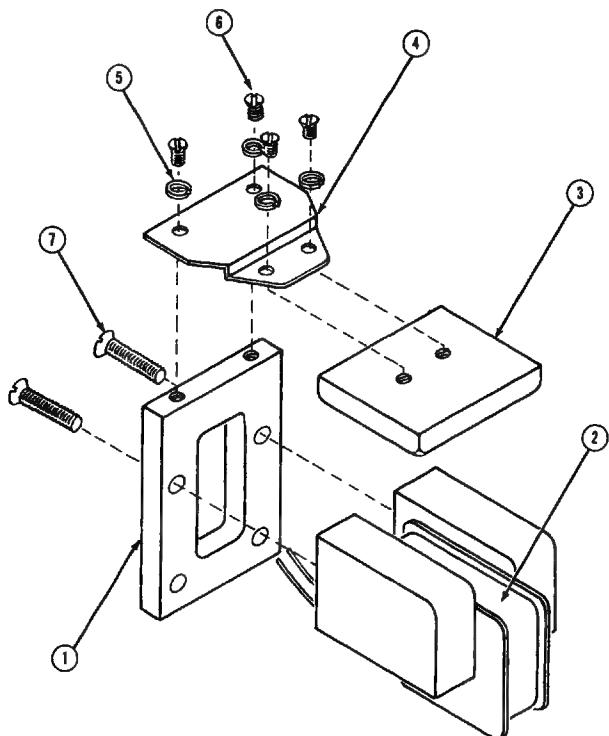
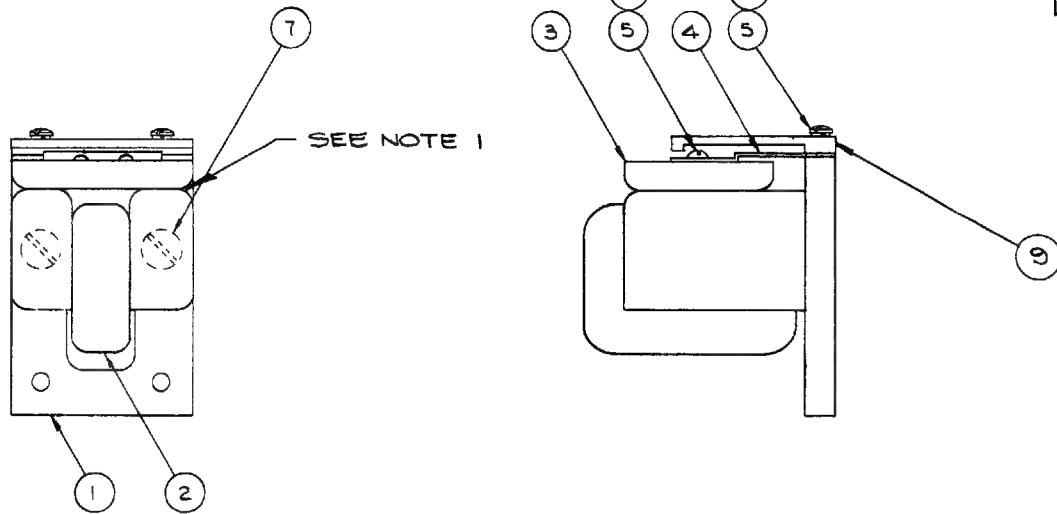


FIGURE 6-4 BRAKE ASSEMBLY

B C1142 C

-0		DRWG NO	DESCRIPTION
		BC1142	BRAKE ASSY
QTY	ITEM	DRWG NO	DESCRIPTION
1	001	BA2287	BASE
1	002	BC1143	COIL ASSEMBLY
1	003	AA2058	ARMATURE
1	004	AA1905	SPRING
4	005	TH-WB0103	LOCKWASHER #4 SPLIT
2	006	TH-SI0801	SCR # 4.40 x 1/8 LG BHM
2	007	TH-SG1407	SCR # 8.32 x 1/2 LG FHM
2	008	TH-SI0804	SCR # 4.40 x 5/16 LG BHM
1	009	AA4203	PLATE, LIMITER



1. ASSEMBLE AND ADJUST AS PER ED175
NOTES:

C ECO 4441	E	4	5-15-64
- ADDED-0, & UPDATED	1	2	12-6-63
B ECO 3973	1	2	7-25-63
A E.C.O. # 2919	1	2	5-29-62
REV E.C.O.	OWN. CHED APP'D. NO. DAY YR.		
MATERIAL	DFK	R	6-29-61
FINISH	SCALE:	1/1	
TOLERANCES UNLESS OTHERWISE NOTED	DEC. $\pm .005$	FRAC. $\pm 1/64$	ANGLE $\pm 1/2^\circ$

DIGITRONICS
ALBERTSON, NEW YORK

TITLE: BRAKE ASSEMBLY

USED ON: 10027 DRAWING NO. B C1142

ILLUSTRATED PARTS BREAKDOWN

ITEM	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
6-5	B-C1443	READ HEAD ASSEMBLY	1
1.	TH-SI0805	Screw, #4-40 x 3/8 lg., BHM	2
2.	TH-SE0835	Screw, #4-40 x 9/16 lg., Fil. Hd. Mach.	2
3.	TH-WB0403	Lockwasher, #4 Split	4
4.	B-A2566	Base Plate	1
5.	A-A2462	Guide Block	1
6.			
7.	B-C1320	Head Assembly	1
8.	B-C1441	Adjustable Guide Assembly	1
9.	B-A2456	Housing, Adjustable Guide	1
10.	S-120-3	Ball	1
11.	TGRPR1212	"O" Ring	1
12.	TH-SI0803	Screw, #4-40 x 1/4 lg., BHM, S-615	1
13.	TH-WA0409	Washer, #4 Flat S-604	1
14.	A-A2635	Knob	1
15.	TH-XC1201	Screw, #6-32 x 1/8 lg., Soc. Hd. Set, Cupt Pt.	1
16.	B-C1943	Shaft/Arm Assembly	1

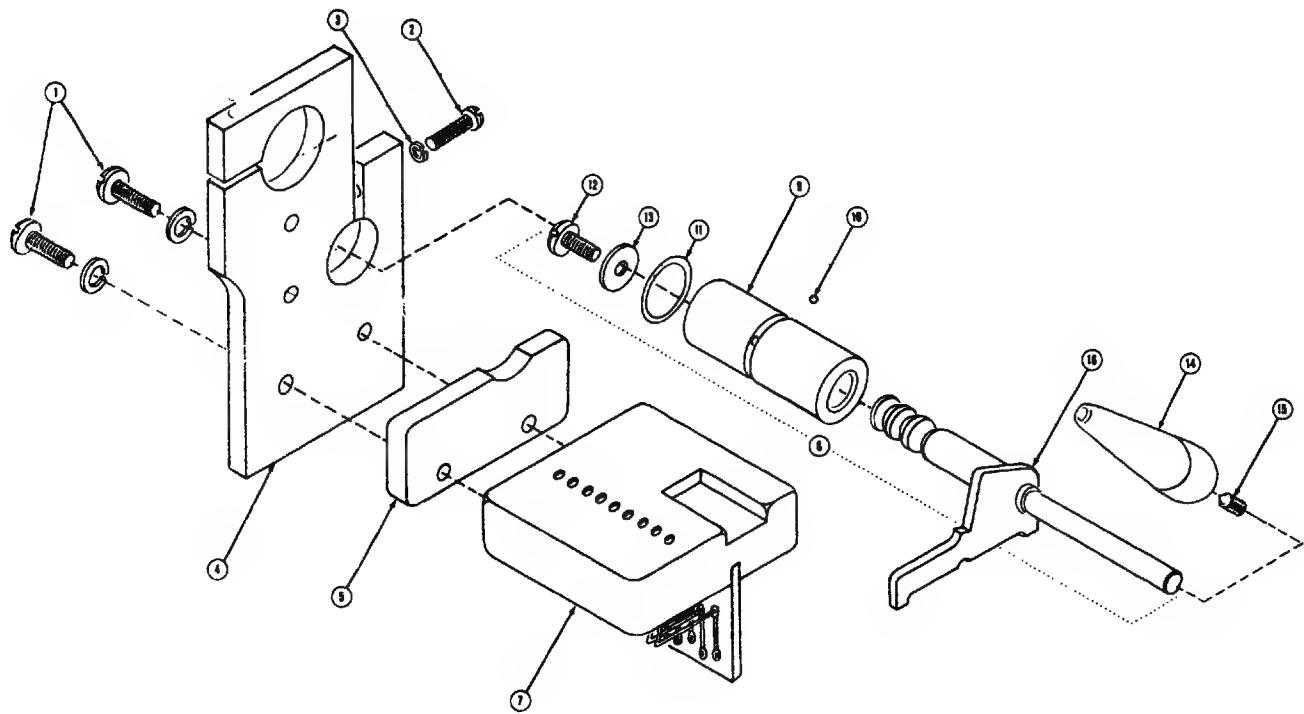
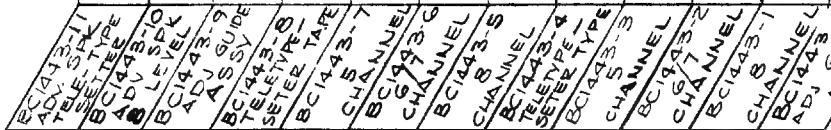


FIGURE 6-5 LENS AND HEAD ASSEMBLY

BC 1443 G

QUAN	DESCRIPTION	PART NO	ITEM											
1	1	1	1	1	1	1	1	1	1	1	1	BASE PLATE	BA 2466	1
-	-	-	-	-	-	-	-	-	-	-	-	HEAD ASSEMBLY	B-C 1320-1	2
-	1	1	-	-	-	-	-	-	-	-	-	ADJUSTABLE GUIDE ASSEMBLY	B-C 1441	3
-	-	-	-	-	-	1	-	-	-	-	1	FIXED GUIDE ASSEMBLY	B-C 2475-1	4
1	1	1	-	1	1	-	-	1	1	1	1	GUIDE BLOCK	A-A 2462	5
2	2	2	2	2	2	2	2	2	2	2	2	SCREW # 4-40 x 3/8 LG. B.H.M.	TH-S10805	6
1	1	1	1	1	1	1	1	1	1	1	1	SCREW # 4-40 x 3/16 LG FIL. HD.M.	TH-SE0835	7
3	3	3	3	3	3	3	3	3	3	3	3	LOCKWASHER # 4 SPLIT	TH-WB0403	8
1	-	-	1	-	1	-	1	-	1	-	-	FIXED GUIDE ASSEMBLY	B-C 2475-2	9
-	-	-	-	1	-	-	1	-	-	-	-	" " "	B-C 2475-3	10
-	-	-	1	-	-	-	1	-	-	-	-	GUIDE BLOCK (TELETYPESETTER) TAPE	AA 2934	11
-	-	1	1	1	1	1	-	-	-	-	-	HEAD ASSEMBLY	CC 1320-3	12
-	1	-	-	-	-	-	-	-	-	-	-	HEAD ASSEMBLY	CC 1320-4	13
-	-	-	-	-	-	-	-	-	-	-	-	HEAD ASSEMBLY	CC 4173-1	14



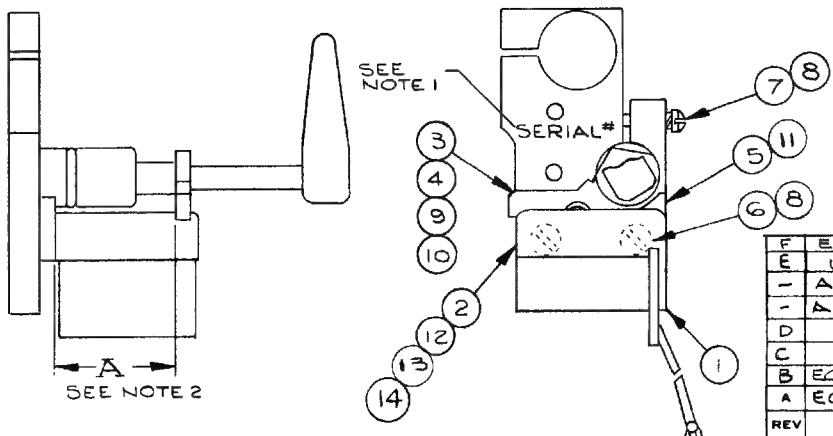
NOTES:

1. STAMP SERIAL NO & CHARACTERS
1/8 HIGH IN BLACK.
2. ADJUST GUIDE ASSY AS FOLLOWS:

DWG. NO.

DIM A

B-C 1443-4-9	1.0015 ± .0005
B-C 1443-1-5 ± .10	.0015 ± .0005
B-C 1443-2-6	.8765 ± .0005
B-C 1443-3-7	.6885 ± .0005
B-C 1443-4-8 ± .11	.8765 ± .0005



SEE BELOW

F	ECO 3964	LO 001	11	7-22-63
E	UPDATED P/L	20	11	5-1-63
-	ADDED DASH 5#	JW	11	2-4-63
-	ADDED DASH -4	LD	11	12-6-62
D	3338	ER	11	10-1-62
C	3097	2K	11	1-30-62
B	ECO 3005	DK	11	6-27-62
A	ECO 2919	DK	11	6-4-62
REV	E.C.O.	DW	CHED	APP'D
MATERIAL		DK	DK	12-1-61

FINISH

TOLERANCES UNLESS OTHERWISE NOTED

DEC. ± .005

FRAC. ± 1/64

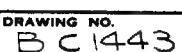
ANGLE ± 1/2°


DIGITRONICS
ALBERTSON, NEW YORK

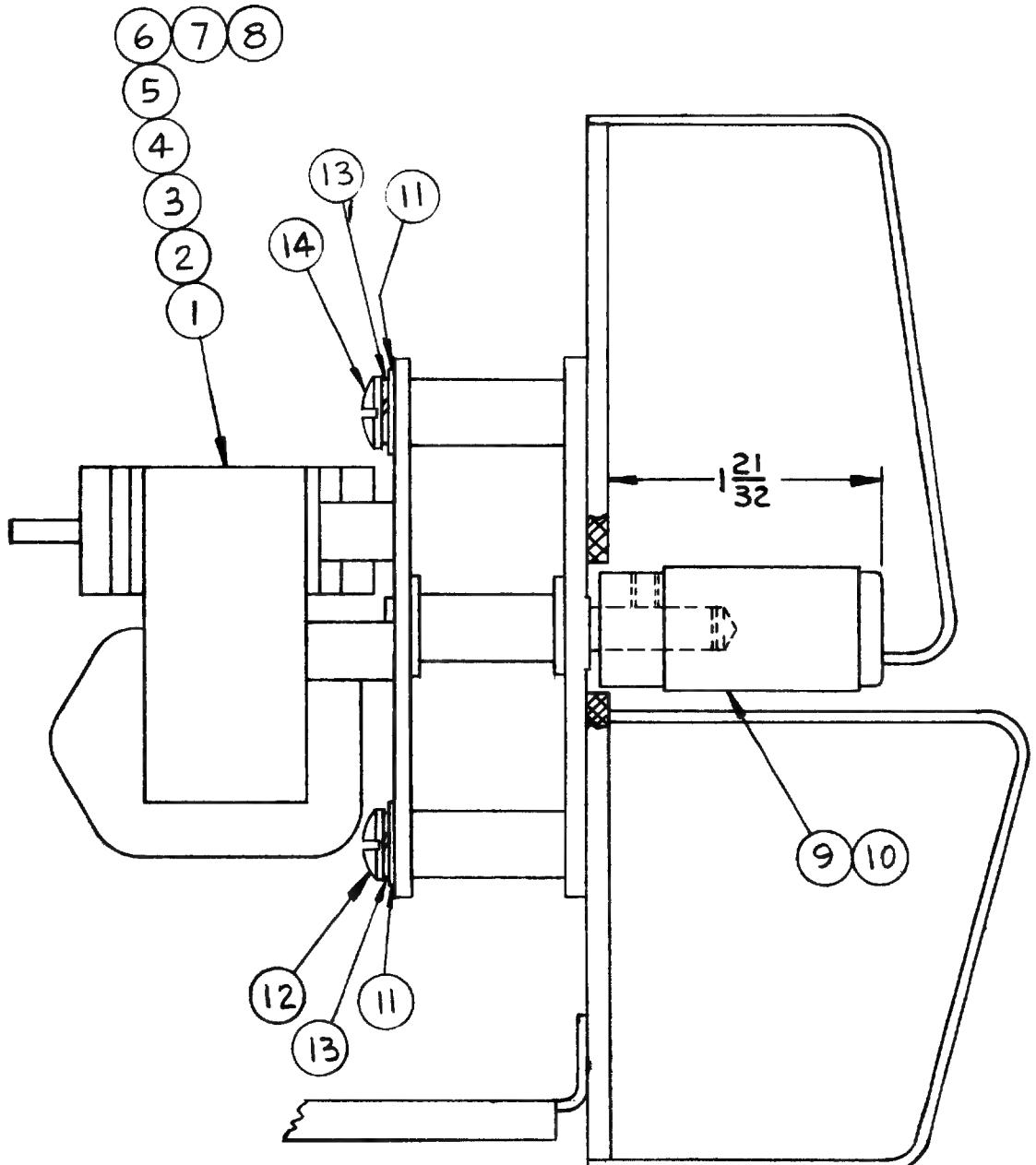
TITLE:

LENS HEAD ASSEMBLY

USED ON:


BC 1443

MOTOR OPTIONS



DRWG. NO									DESCRIPTION	
BC1935									MOTOR OPTION ASSY	
QTY	QTY	QTY	QTY	QTY	QTY	QTY	QTY	ITEM	DRWG. NO	DESCRIPTION
1	-	-	-	-	-	-	1	001	CC2196	MTR ASSY MTR SPD(100)
-	-	-	-	1	-	-	-	002	CC2196-1	(133)
-	-	-	1	-	-	-	-	003	CC2196-2	(75)
-	-	1	-	-	-	-	-	004	CC2196-3	(66)
-	1	-	-	-	-	-	-	005	CC2196-4	(50)
-	-	-	-	-	-	-	1	006	CC2197	(300)
-	-	-	-	-	1	-	-	007	CC2198	(400)
-	-	-	-	-	1	-	-	008	CC2549	MTR ASSY MTR SPD (200)
-	-	1	1	1	1	1	1	009	BC985	CAPSTAN ASSEMBLY
1	-	-	-	-	-	-	-	010	BC1955	CAPSTAN ASSEMBLY
3	3	3	3	3	3	3	3	011	TH-WA0814	WASHER #10 FLAT
1	1	1	1	1	1	1	1	012	TH-SI1712	SCR #10-32X1 1/8 B.H.M.
3	3	3	3	3	3	3	3	013	TH-WB0810	LOCKWASHER #10 SPLIT
2	2	2	2	2	2	2	2	014	TH-SI1740	SCR. #10-32X1 3/16 B.H.M.
								015		

G	4591	FB	11	10-29-64
F	4539	F.B.	10	9-18-64
E	ECO 4464	E	11	6-9-64
D	3490	LD	10	12-10-62
C	3115	SCR	10	8-6-62
B	3091	SE	10	7-26-62
A	ADDED ITEM 5 ECO#2943	1P	10	6-5-62
REV	E.C.O.	DWN.	CHKD.	APP'D.
MATERIAL		NO	10	6-1-62
SCALE: FULL				
FINISH				
TOLERANCES UNLESS OTHERWISE NOTED		DEC. $\pm .005$	FRAC. $\pm 1/64$	ANGLE $\pm 1/2^\circ$

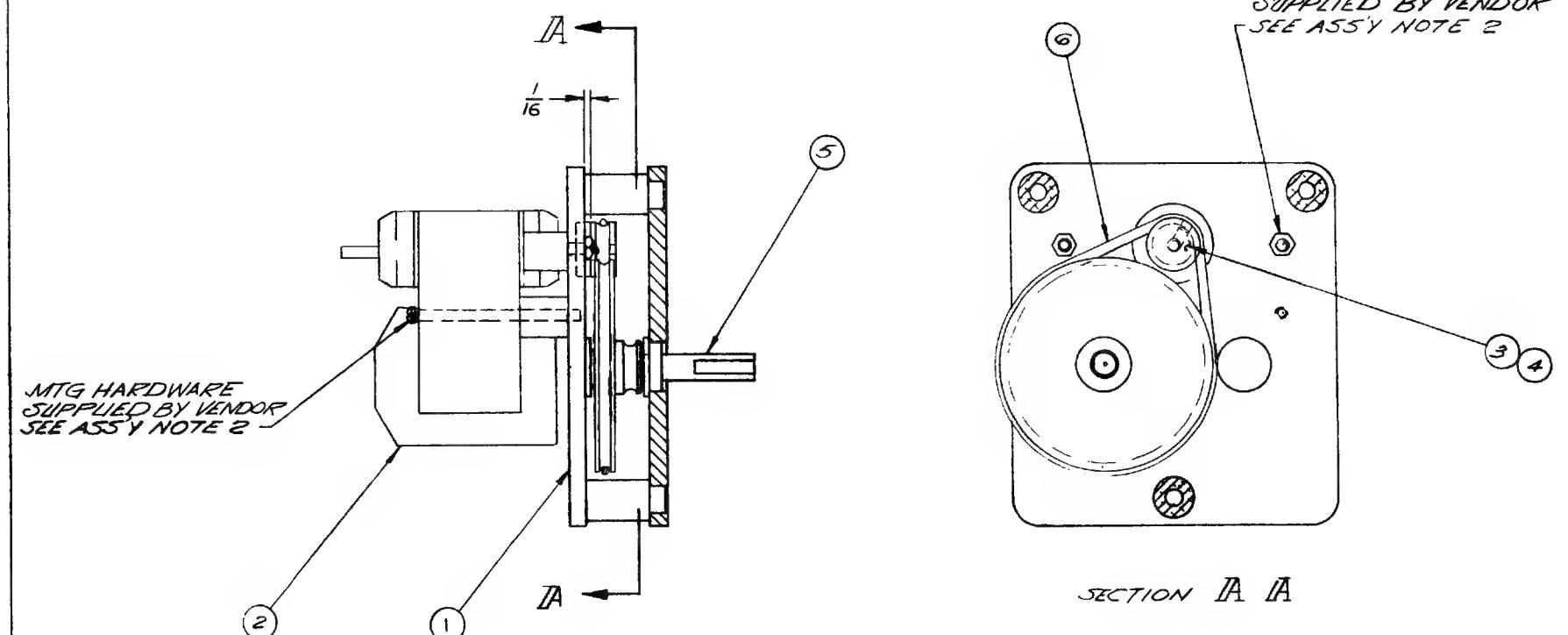
ADJUST PER E-O 40
WIRES AS PER DK 296 FOR MODEL 2500
WIRES AS PER DK 299 FOR MODEL 2500M

DIGITRONICS
ALBERTSON, NEW YORK

TITLE: MOTOR OPTION ASSEMBLY

USED ON: DRAWING NO. B-C1935

QUAN	DESCRIPTION	REF STC	DWG NO	ITEM
1	PLATE, ASSY		B-C2154	1
1	MOTOR, MODIFICATION		B-C2847	2
1	PULLEY, MOTOR		A-A3085	3
1	SET SCREW #4-40 X 1/8 LG. ST. ST. CUP PT	TH-XB0801		4
1	PULLEY ASSEMBLY		B-C2152	5
1	"O" RING, "DISOGRIN" # 131		TGRPDD0404	6
				7
				8



ASSEMBLY PROCEDURE:

1. ASSEMBLE ITEM 3 (PULLEY, MOTOR) TO ITEM 2 (MOTOR) USING ITEM 4 (SET SCREW) AS SHOWN
2. ASSEMBLE ITEM 2 (MOTOR) TO REAR PLATE OF ITEM 1 AS SHOWN
3. ASSEMBLE 1 ITEM 5 (PULLEY ASS'Y) AS SHOWN
4. ASSEMBLE ITEM 6 ("O" RING) AS SHOWN
5. PLACE FRONT PLATE OF ITEM 1 (PLATE ASS'Y) IN PLACE

D	4024	E	60	530-63
C	ECO 3931	CD	7-9-63	
B	ECO 3861	CD	7-10-63	
A	UPDATED P/L	SP	5-23-63	
REV	ECO.	DMW	CHD	ED DAY TR.
MATERIAL		1	1	7-20-63
FINISH		SCALE 1/1		
TOLERANCES UNLESS OTHERWISE NOTED		DEC. ± 005	FRAC. ± 1/64	ANGLE ± 1/16
USED ON		DRAWING NO. C-C2197		

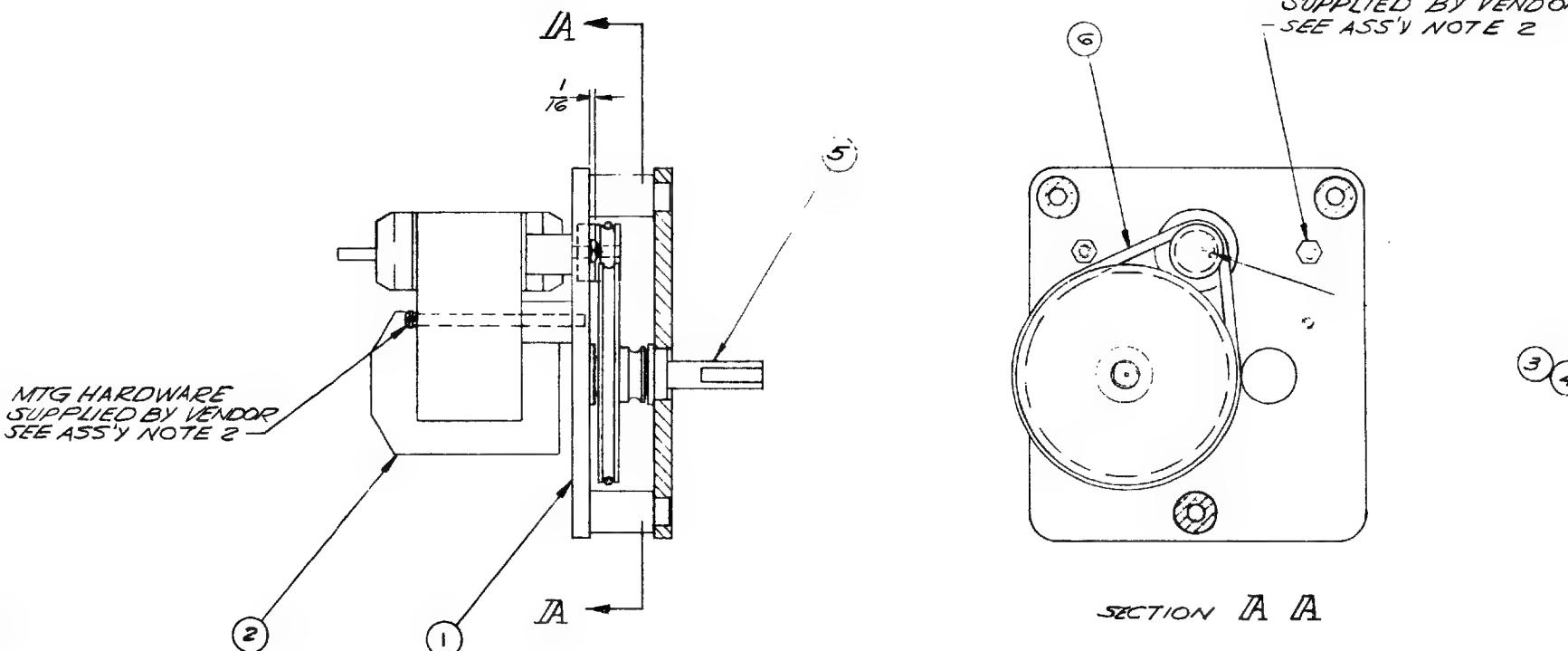
DIGITRONICS
ALBERTSON NEW YORK

MOTOR-REDUCER ASS'Y -
(300 CH/SEC)

MOTOR-REDUCER ASSY

CC2549C

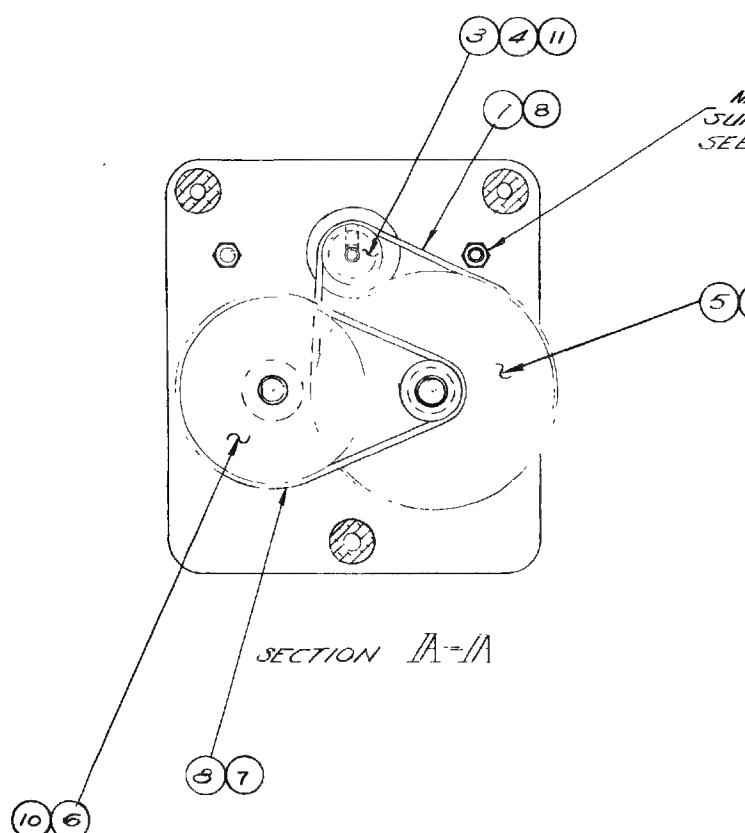
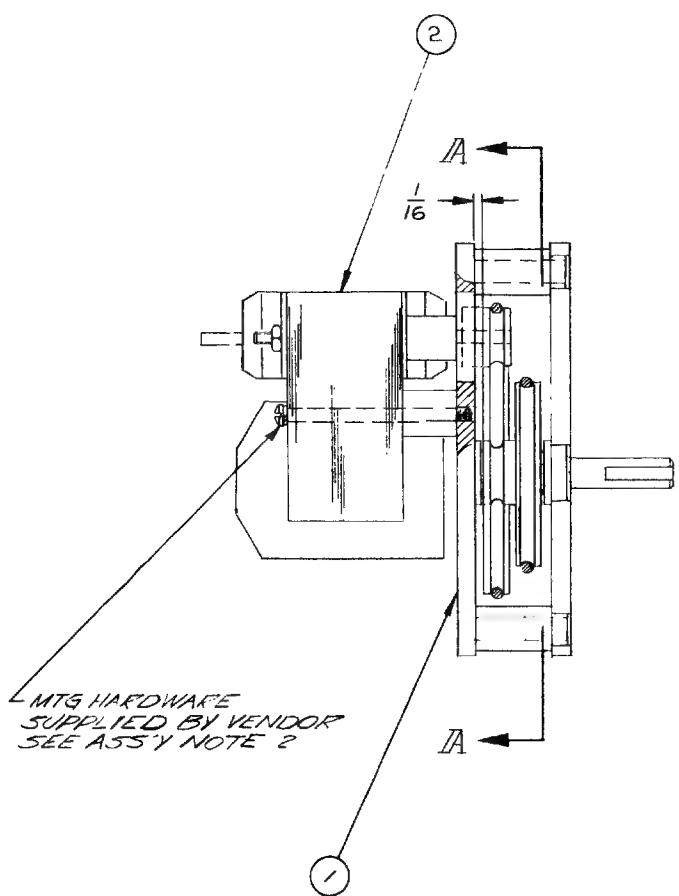
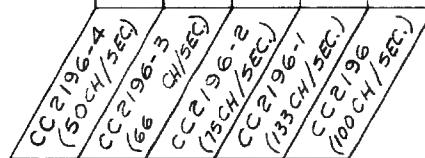
QUAN	DESCRIPTION	REF GTD	DWG. NO	ITEM
1	PLATE, ASSY	BC2542		1
1	MOTOR, MODIFICATION	BC2847		2
1	PULLEY, MOTOR	AA3361		3
1	SET SCREW #4-40X1/8 LG. ST. ST. CUPPT. TH-XB0801			4
1	PULLEY ASSEMBLY	BC2152		5
1	O" RING, "PRECISION" O" RING # 131-8307	TGRPD0404		6
				7
				8



ASSEMBLY PROCEDURE:

1. ASSEMBLE ITEM 3 (PULLEY, MOTOR) TO ITEM 2 (MOTOR) USING ITEM 4 (SET SCREW) AS SHOWN
2. ASSEMBLE ITEM 2 (MOTOR) TO REAR PLATE OF ITEM 1 AS SHOWN
3. ASSEMBLE 1 ITEM 5 (PULLEY ASS'Y) AS SHOWN
4. ASSEMBLE ITEM 6 (O"RING) AS SHOWN
5. PLACE FRONT PLATE OF ITEM 1 (PLATE ASS'Y) IN PLACE

C 4363	(PL)	DS	0-6664
B 4024	E	REV	10-30-63
A E.C.O. 3931	LD		7-8-63
REV	E.C.O.	DATE	APR 1963
MATERIAL		BN	10-27-62
TOLERANCES UNLESS OTHERWISE IND. DEC. 2 COS. TOLER. 84 ANGLE + 12			
SECTION		DRAWING NO CC2549	
DIGITRONICS ALBERTSON NEW YORK			
MOTOR-REDUCER ASS'Y (200 CH/SEC)			



ASSEMBLY PROCEDURE:
1. ASSEMBLE ITEM 3 OR 11 (PULLEY, MOTOR) TO
ITEM 2 (MOTOR) USING
ITEM 4 (SET SCREW) AS SHOWN
2. ASSEMBLE ITEM 2 (MOTOR) TO
REAR PLATE OF ITEM 1 AS SHOWN

3. PLACE ITEM 5,19 (PULLEY ASSEMBLY) IN PLACE & ASSEMBLE ITEM 7 OR 8 ("O" RING) AS SHOWN

AS SHOWN
4. PLACE ITEM G,10 (PULLEY ASSEMBLY)
IN PLACE & ASSEMBLE ITEM 7 & 8 ("O"RING)
AS SHOWN

AS SHOWN
5. PLACE FRONT PLATE OF ITEM 1
(PLATE ASSEMBLY) IN PLACE

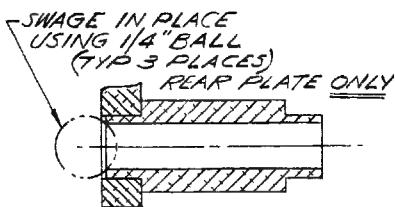
F	4264	SR	1	2-10-64
E	4024	E	1	5-30-63
D	E.C.O. 3931	LD	1	7-9-63
C	ECO 3861	LD	1	6-10-63
B	3813	RE	1	5-10-63
A	3670	SR	1	2-26-63
	ADDED, DASH NO (-1 THRU -4)	CD	1	12-7-62
REV	E.C.O.	DWN.	CHKD. APP D.	NO DAY YR
MATERIAL		15	ND	7-21-62
		SCALE	11	
FINISH				
TOLERANCES UNLESS OTHERWISE NOTED		DEC. \pm 005	FRAC. \pm 1/64	ANGLE \pm 1/2°

► DIGITRONICS 

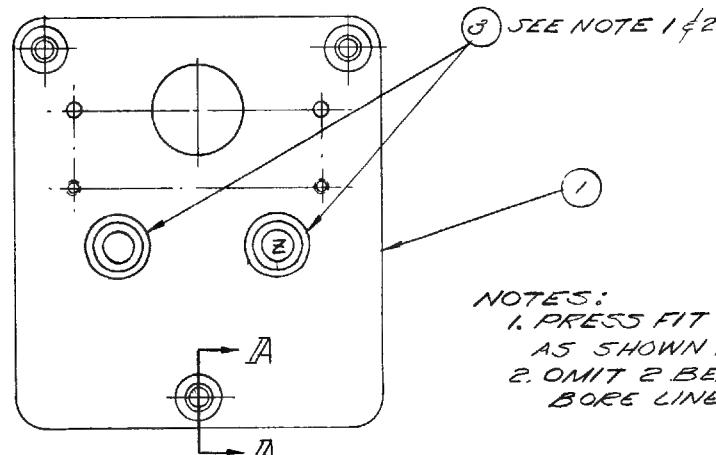
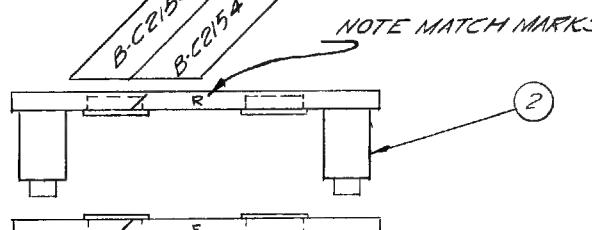
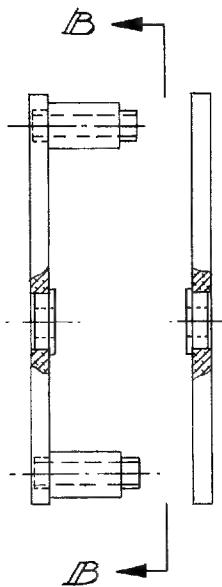
MOTOR-REDUCER ASS'Y

B-C2154 B

QUAN	QUAN	DESCRIPTION	DWG NO.	ITEM
1	1	PLATES, REDUCER HOUSING	B-A3078	1
3	3	SPACER	A-A3077	2
2	4	BEARING, NEW HAMPSHIRE # SF1	TB-BR0017	3



SECTION A-A
SCALE 2/1



NOTES:
1. PRESS FIT 4 BEARINGS
AS SHOWN FOR B-C2154-1
2. OMIT 2 BEARINGS AT
BORE LINE (2) FOR B-C2154-2

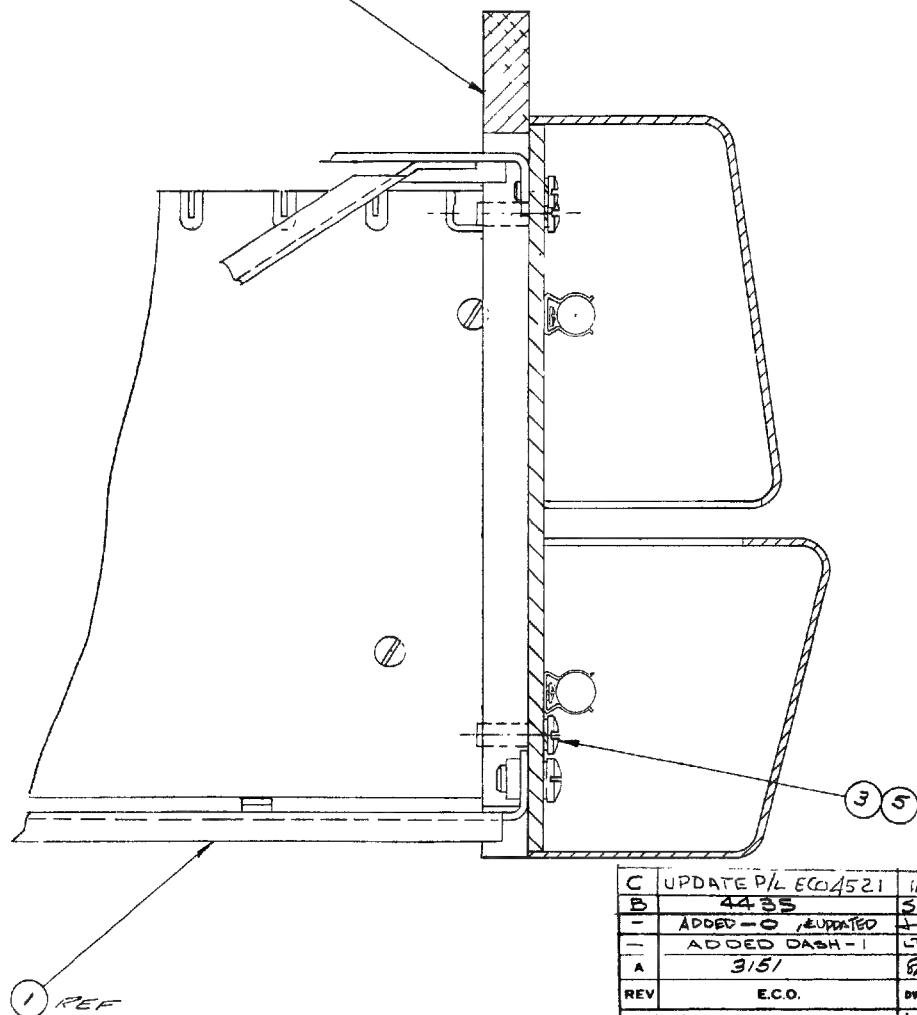
VIEW B-B

 DIGITRONICS <small>ALBERTSON, NEW YORK</small>	
TITLE: <i>PLATE A55'y</i>	
USED ON:	DRAWING NO. <i>B-C2154</i>

MOUNTING OPTIONS

BC1936C

4 2



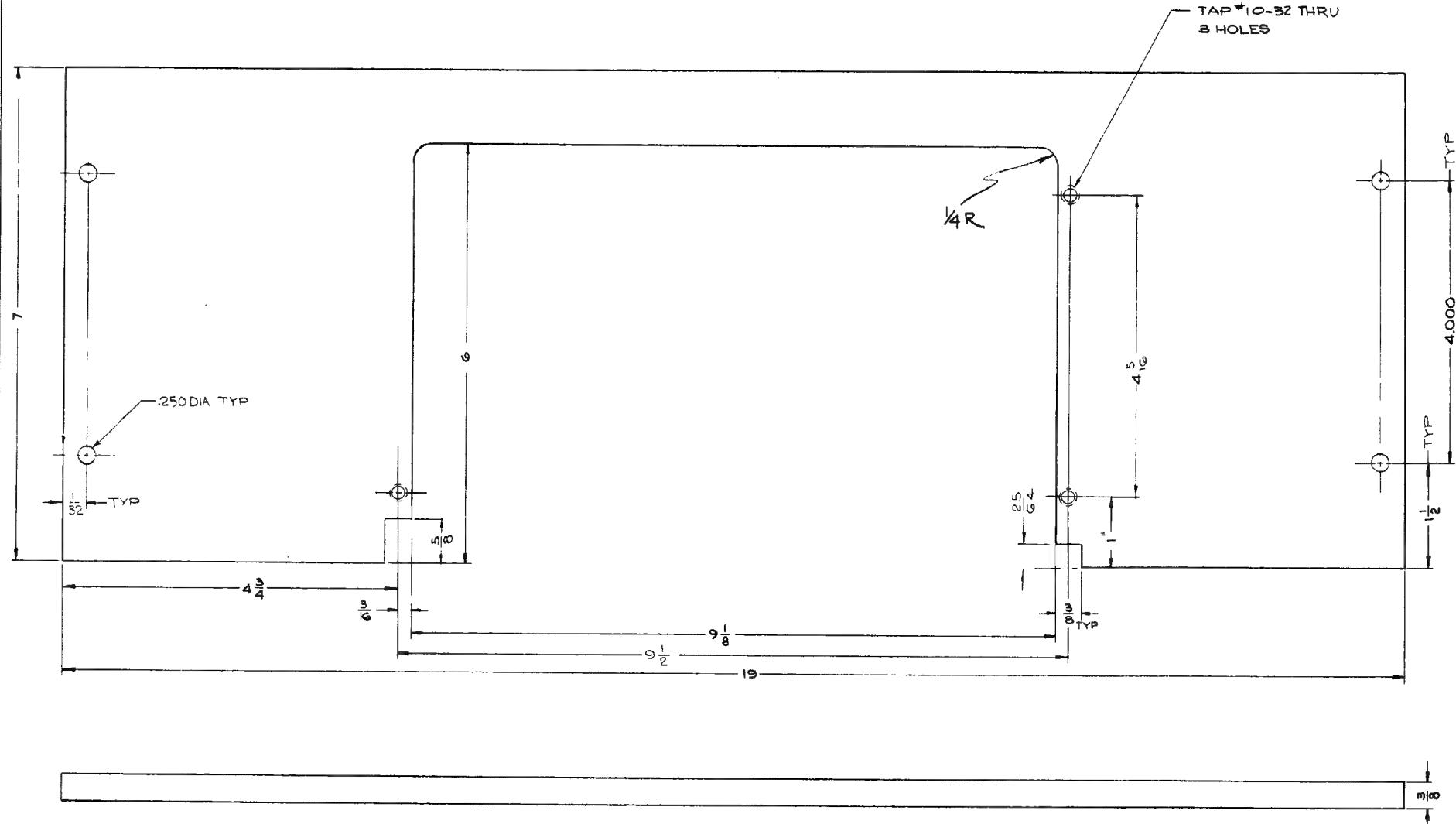
REF		REF	DWGRG NO.	DESCRIPTION
			BC 1936	RACK MOUNTING OPTION ASSY
-	1	001		READER ASSY
-	1	002	CA2476	PANEL RACK MOUNTING
3	3	003	TH-SI1707	SCREW #10-32X 5/8 BHM
1	-	004	CA2476-1	PANEL RACK MOUNTING
3	3	005	TH-WB0810	LOCKWASHER, SPLIT #10
- REF		006	AT 67	PAINT AS PER
REF -		007	AT 173	PAINT AS PER

C	UPDATE P/L ECO/4521	IN	X	X	8-28-64				
B	4435	SP	1	4-6-64					
-	ADDED -0	ADDED	1	12-6-63					
-	ADDED DASH -1	LD	1	12-6-62					
A	3151	FR	JMS	9	8-27-62				
REV	ECO.	BWN.	CHKD	APP'D.	NO. DAY YR.				
MATERIAL		15	15	15	6-2-62				
FINISH		SCALE: 1/1							
TOLERANCES UNLESS OTHERWISE NOTED									
DEC. \pm .005 FRAC. \pm 1/64 ANGLE \pm 1/2°									

DIGITRONICS
ALBERTSON, NEW YORK

TITLE: RACK MOUNTING OPTION A-T57

USED ON: DRAWING NO. BC 1936



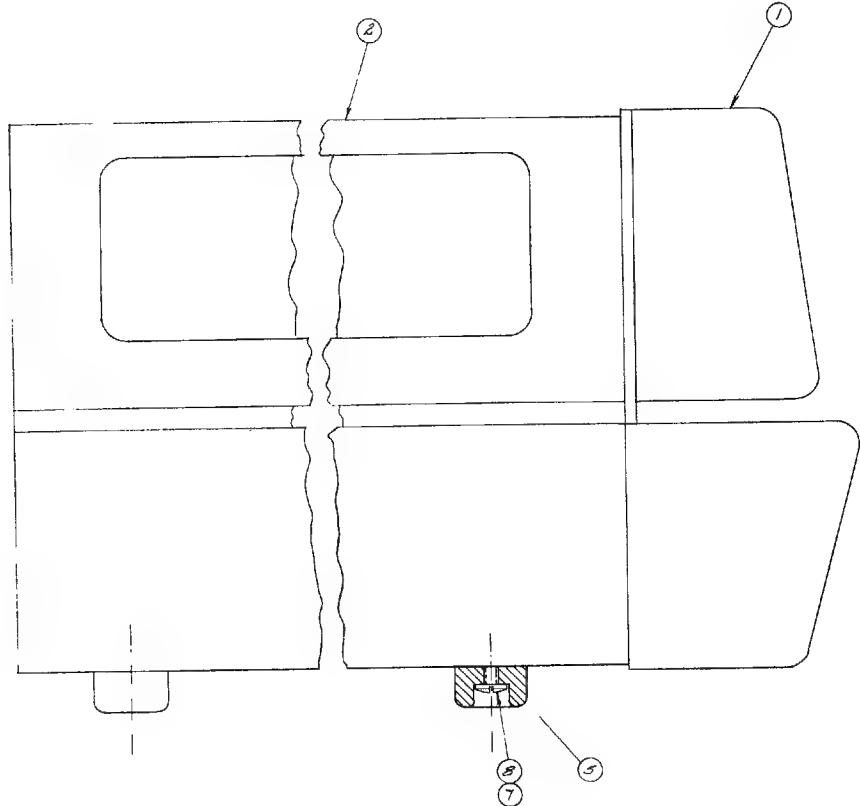
PART NO.	FINISH
CA247G	PAINT FRONTR. EDGES AT G1
CA247G-1	PRIMED NOT FINISH

C	ADDED DASH - 1	REV	12-10-67
B	351	TYPE	0 8-27-67
A	ECO 2919	SIZE	5-29-67
REV	ECO.	DRW. CHRD. APP'D.	NO. DAY
MATERIAL		DFK	24-30-67
ALUM ALLOY		SCALE	1/1
2024-T4		FINISH SEE TABLE	
TOLERANCES UNLESS OTHERWISE NOTED		DEC. \pm .005	FRAC. \pm 1/64
		ANGLE \pm 1/2	

DIGITRONICS
ALBERTSON NEW YORK

DRAWING NO.
C-A2476

Q'TY	Q'TY	DESCRIPTION	PART NO.	ITEM
REF	REF	READER ASSY		1
—	1	CASE ASSY (PAINTED)	OC-1928	2
1	—	CASE ASSY (UNPAINTED)	OC-1928-1	3
				4
4	4	RUBBER FOOT, ATLANTIC INDIA RUBBER #18		5
				6
4	4	LOCKWASHER #8, SPLIT	TH-WB0712	7
4	4	SCREW, B.H.M #8-32X1 1/2	TH-S1407	8
				9
				10
				11



ADDED DASH -1		10	12-7-62
A	3215	RH JNS	9-7-62
REV	E.C.O.	DEP. CHED. APP'D.	DO. DAY YR.
MATERIAL		1810	6-462
		SCALE:	FULL
FINISH			
TOLERANCES UNLESS OTHERWISE NOTED		DEC. ± .005	MMAC. ± 1/64
		ANGLE ± 1/2°	

DIGITRONICS
ALBERTSON, NEW YORK

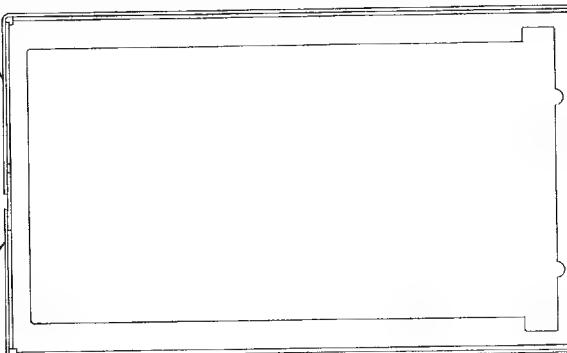
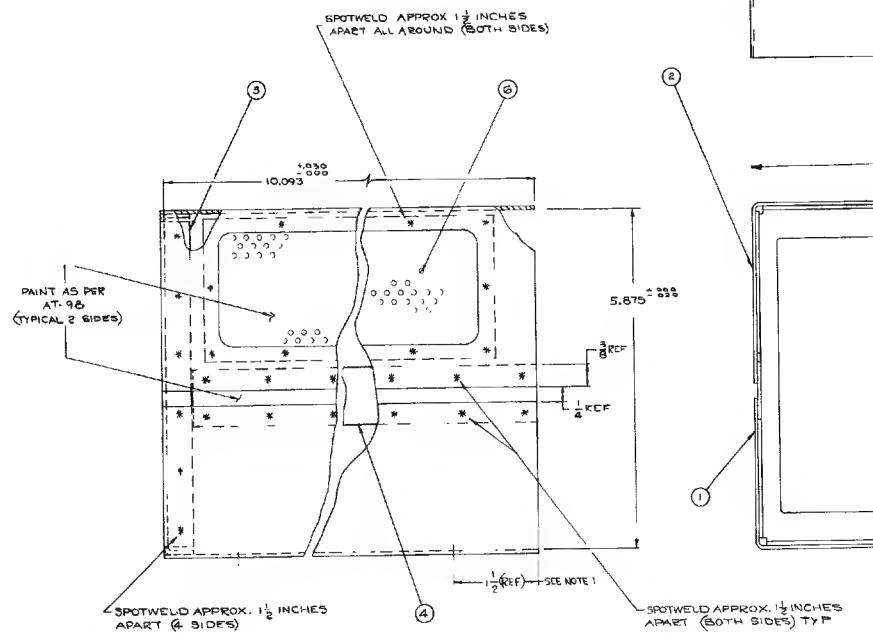
TITLE: CASE ASSEMBLY OPTION
(ECONOMY READER)

USED ON: 10027 DRAWING NO. C-C1921

D-C 1928

QUAN	QUAN	QUAN	DESCRIPTION	PART NO. ITEM
1	1	1	CASE, LOWER	C-1928 1
1	1	1	CASE, UPPER	C-1928 2
1	1	1	BACK PLATE	C-1928 3
2	2	2	FILLER STRIP, CASE	B-1928 4
1	1	1	CASE, LOWER MOLD	C-1928 5
2	2	2	SCREEN	A-A 2902 6

DC 1928-2
DC 1928-1
DC 1928-3

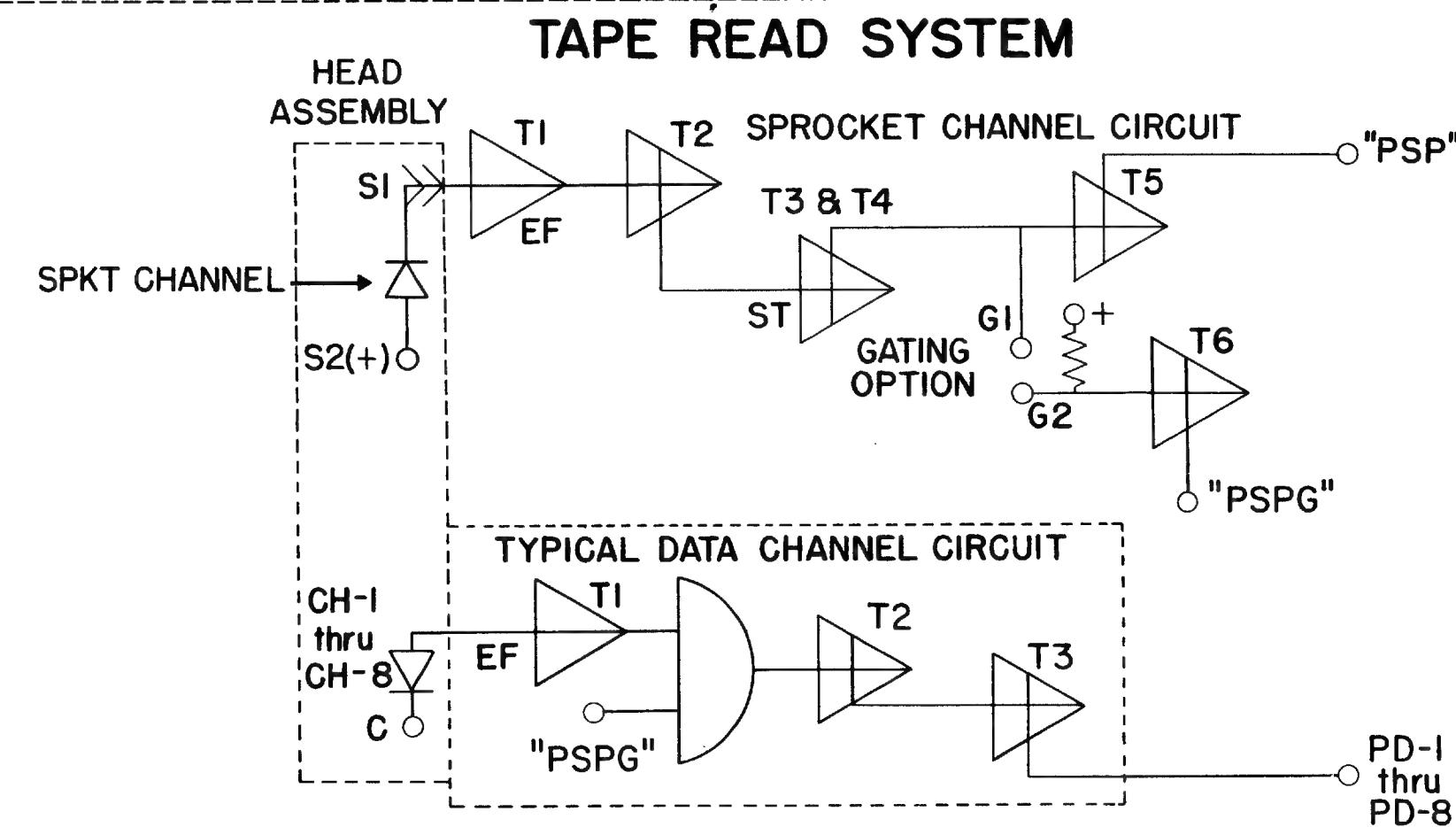
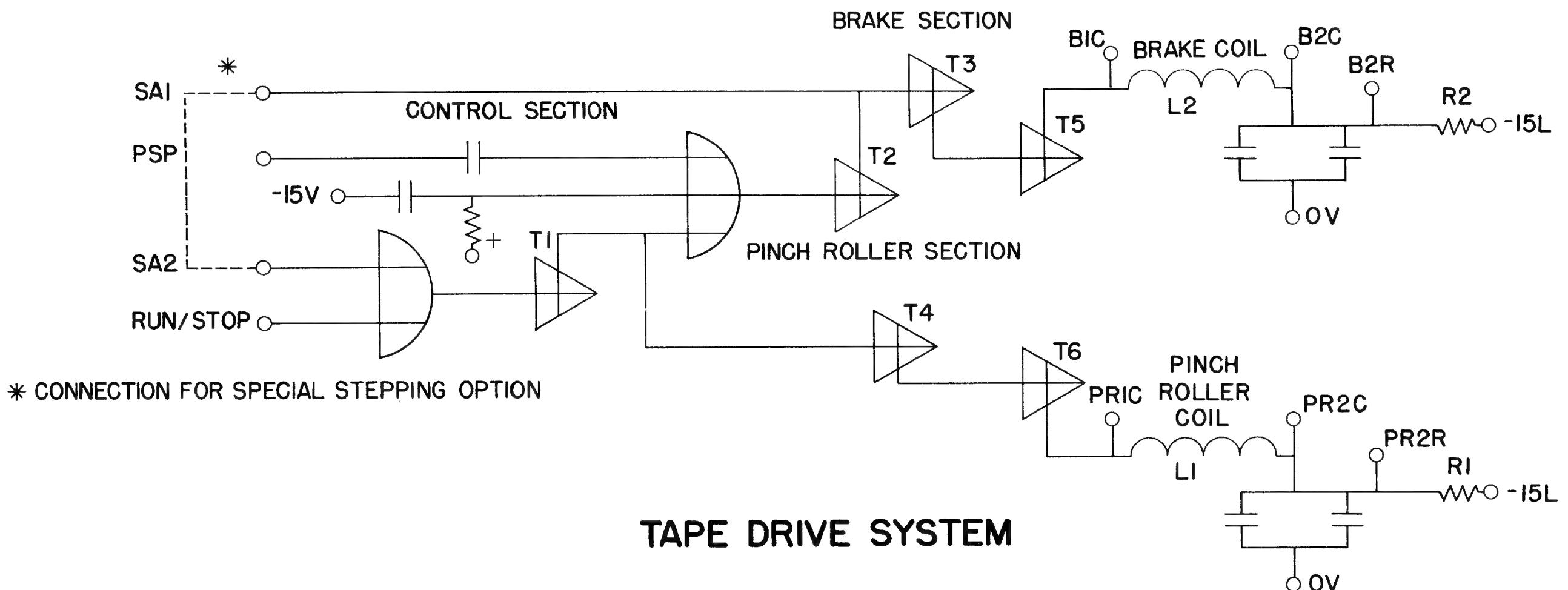


NOTES:
1. ASSEMBLE WITH HOLE PATTERN
ORIENTED AS SHOWN
2. FINISH: SEE TABLE

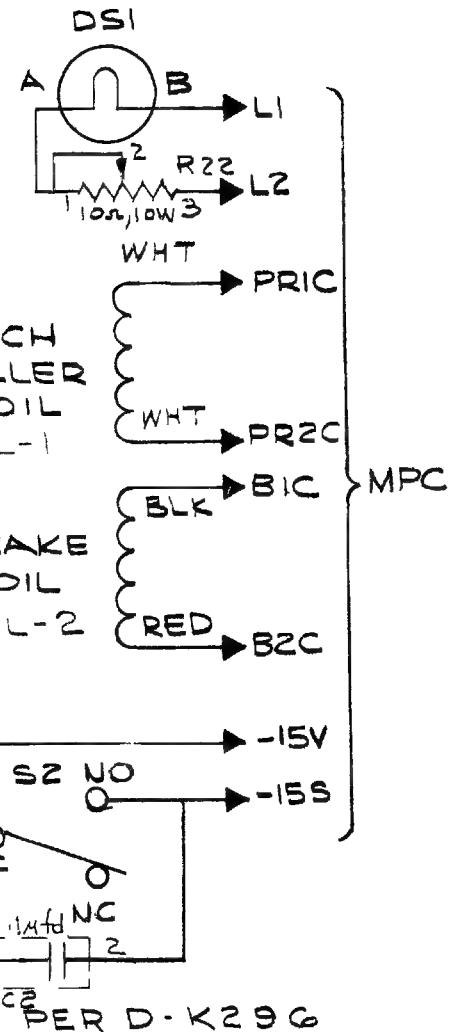
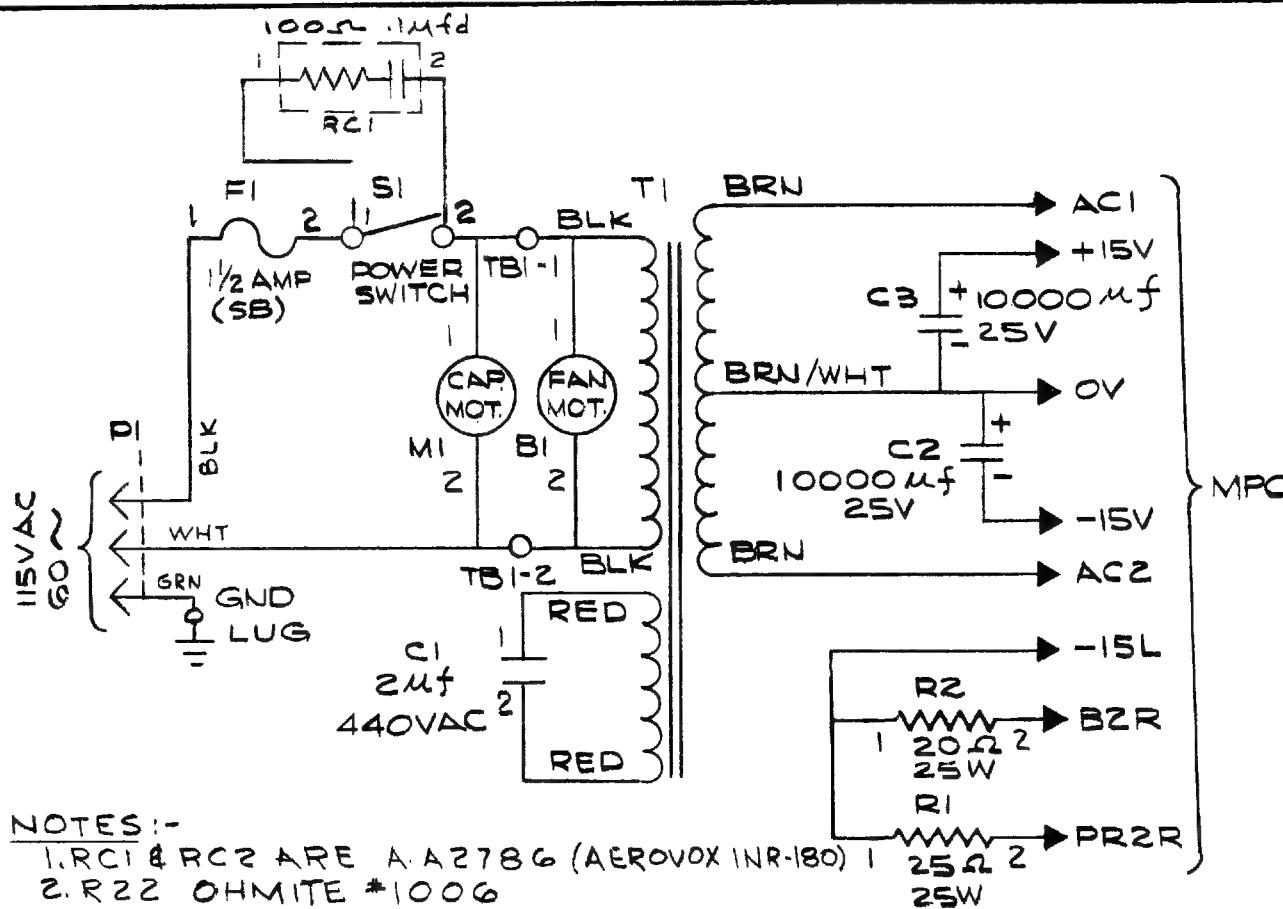
PART NO	FINISH
DC-1928	SURFACE PRIMED
DC-1928-1	PRIMED
DC-1928-2	PRIMED SEE AT-68

DIGITRONICS
ALBANY, NEW YORK
TITLE: CASE ASSEMBLY
USED ON: 10027 DRAWING NO: D-C 1928

**LOGIC DIAGRAM, SCHEMATICS,
AND WIRING DIAGRAM**



MODEL 2500



WIRE AS PER D-K296



DIGITRONICS

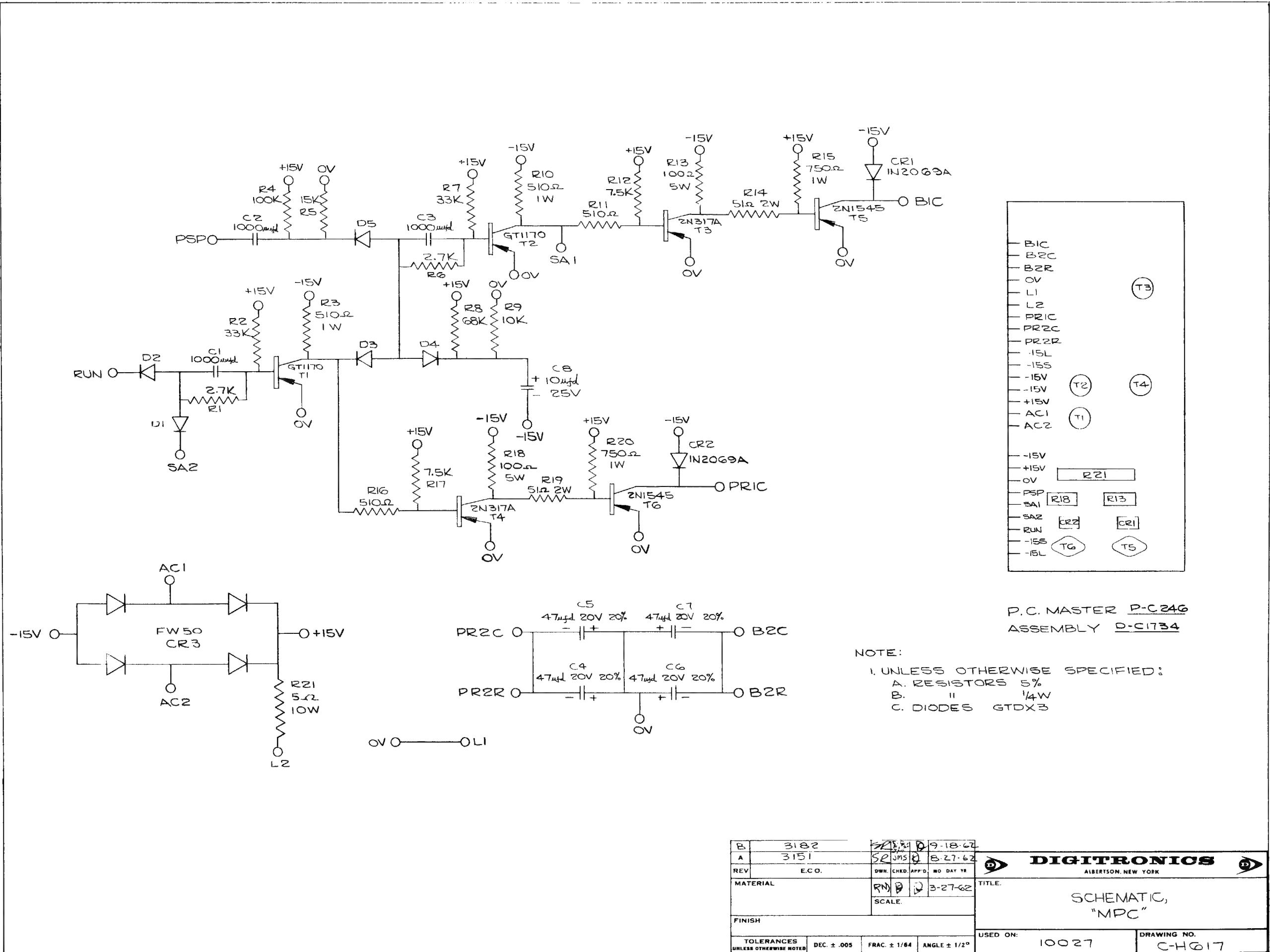
ALBERTSON, NEW YORK

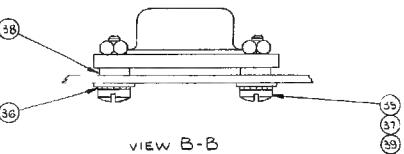
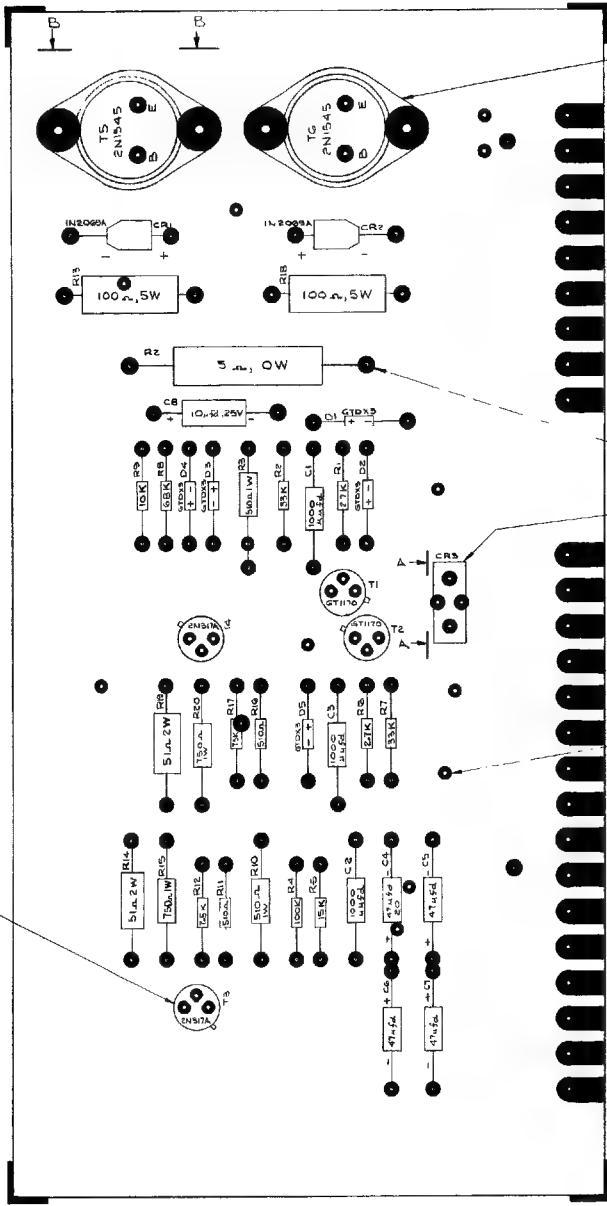
TITLE:

SCHEMATIC DIAGRAM POWER SUPPLY

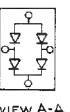
USED ON:

DRAWING NO.
A-H634





VIEW B-B



VIEW A-A

QUAN	DESCRIPTION	DWG. NO.	ITEM
1	BOARD DRILLED MPC (PC 24G-A)	C-A-2736	1
78	EYELET	TY-340001	2
20	EYELET	TY-340002	3
4	TRANSISTOR SPACER	TQ-3410001	4
			5
			6
			7
2	TRANSISTOR, 2N1545	TQ-PA1545	8
2	"	TQ-PA1545A	9
2	"	TQ-PA1170	10
			11
			12
2	DIODE IN2069A	TQ-2069A	13
5	"	TQ-2069S	14
			15
			16
3	CAPACITOR, 1000uF 40V 5%	TC-ME100C	17
1	"	TC-ME100B	18
1	0.01uF 25V 10%	TC-TH100C	19
4	"	TC-TH100B	20
1	RECTIFIER, MALLORY FW50	TQBP50001	21
			22
1	RESISTOR, 51K 1W 5% CARBON	TE-W5101C	23
1	"	TE-CD510C	24
2	510u 1W	TE-CC510C	25
1	750u 1W	TE-CC750C	26
1	2.7K 1/4W	TE-CA275C	27
2	"	TE-CA752C	28
1	10K "	TECA109C	29
1	"	TECA153C	30
2	33K "	TECA333C	31
1	68K "	TECA683C	32
1	100K "	TECA104C	33
2	"	TECA105C	34
1	100K 1W SPRAGUE	TE-W100C	35
4	SCREW #4-40X 1/2 LG. BINDING	TH-30007	36
4	LOCKWASHER #4 EXTERNAL	TH-W0008	37
4	WASHER #4 PLAIN	TH-W0009	38
4	"	TH-W0006	39
4	NUT, HEX #4-40	TH-NA0704	40

REF:SCHEMATIC DWG. NO. C-HG17

F	ECO 4500 (PA)	X	5	5-20-64
E	ECO 4094	W	10	18-23
C	ECO 0.0002	W	10	18-23
C	5.494	W	10	18-23
D	3.182	S	10	11-14
	3.151	S	10	12-14

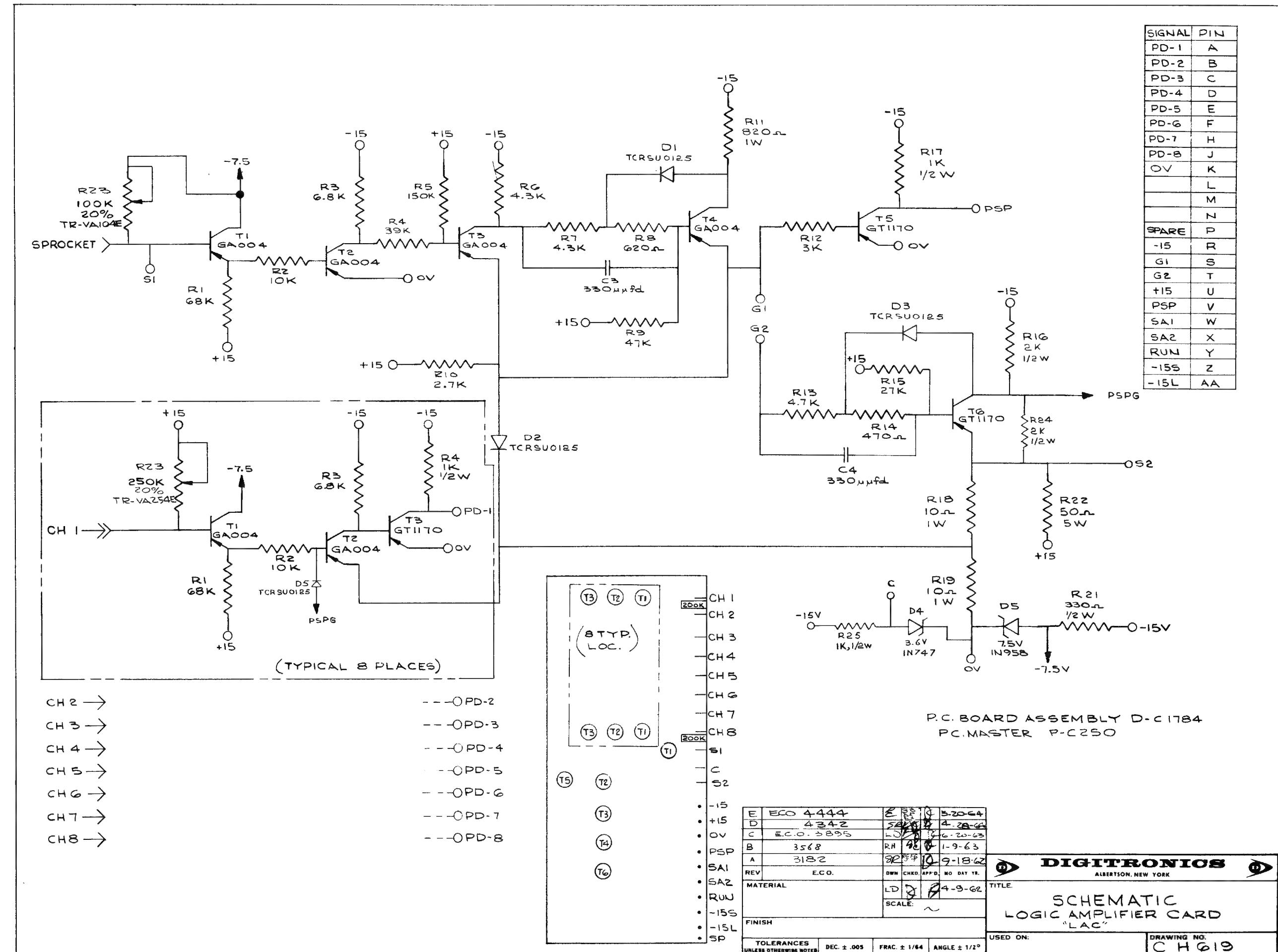
LD 5-20-64

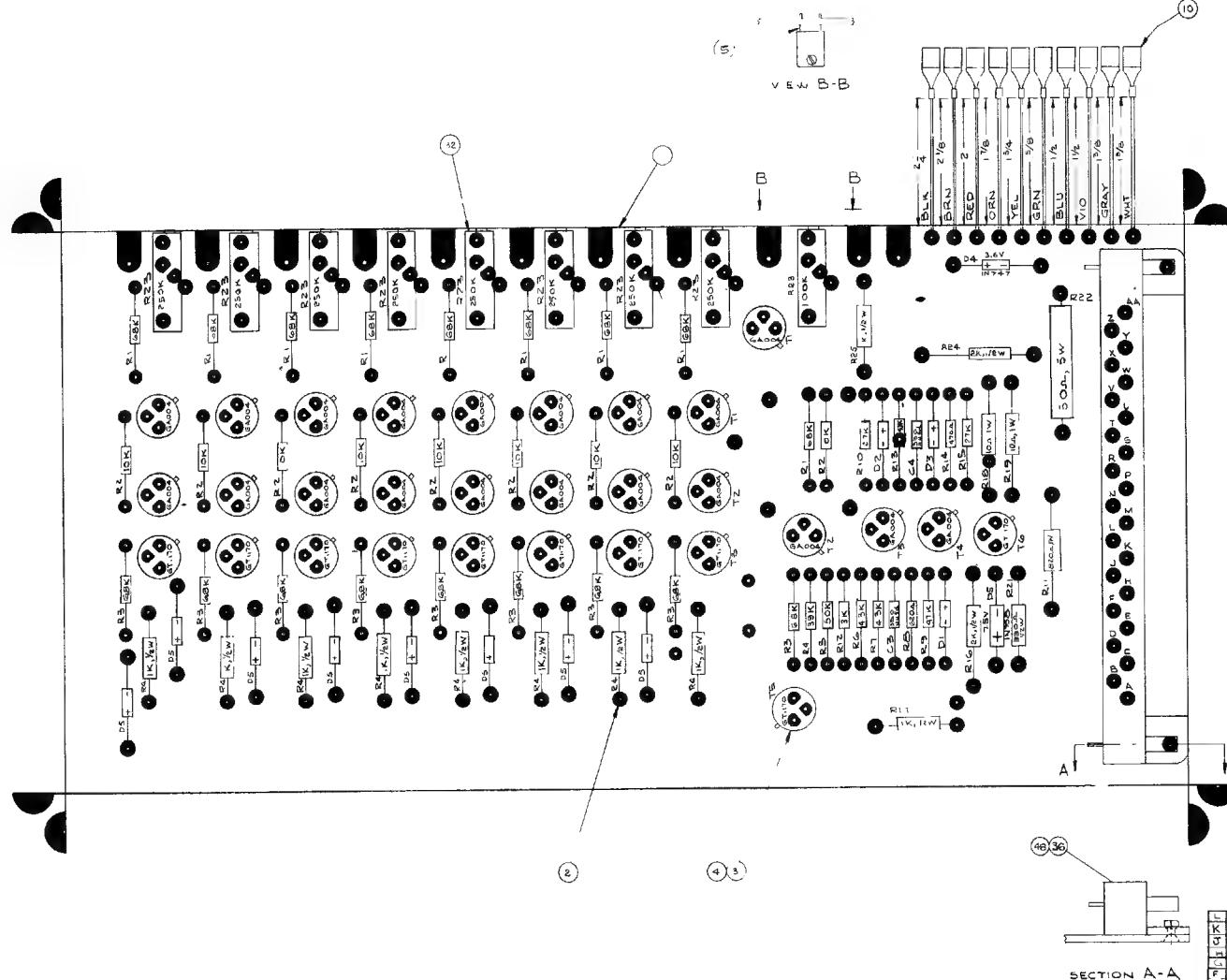
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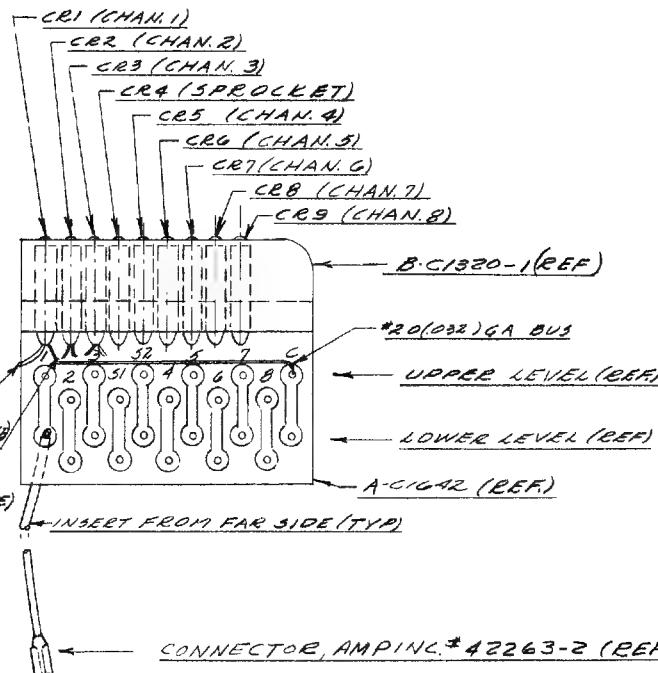
Digitronics
Assembly, New York
TITLE
P.C. BOARD ASSEMBLY
"MPC"

USED ON

D-C-1734

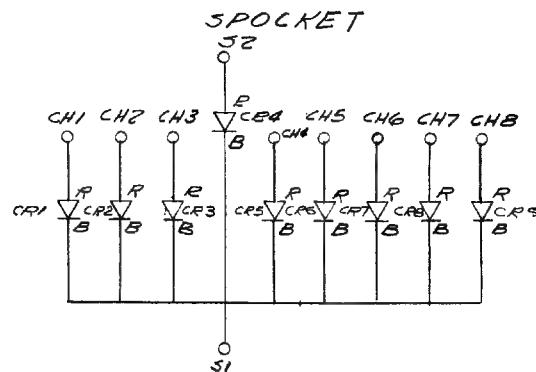






LOWER LEVEL CABLE #24 GA.			
FROM	TO	FROM	LGTH. COLOR TERM
CR1-R	A-C1642-1 UPPER LEVEL	A-C1642-1 LOWER LEVEL	9" BLK. 1
CR2-R	-C	-2	9 3/4" BEN 2
CR2-B	-C	-3	10 1/2" RED 3
CR3-R	-3	-3	12 3/4" GRN 6
CR3-B	-C	-4	11 1/4" OGN 4
CR4-B	-51	-5	12 " YEL 5
CR4-B	-52	-6	12 3/4" GRN 6
CR5-R	-4	-7	13 1/2" BLU 7
CR5-B	-C	-8	14 1/4" PUR 8
CR6-R	-5	-51	15" GRAY 51
CR6-B	-C	-C	15 3/4" WHI C
CR7-R	-6	-C	16 1/8" BLK/WHI 52
CR7-B	-C	-52	
CR8-R	-7		
CR8-B	-C		
CR9-R	-8		
CR9-B	-C		

* AMPLIFIER CARD - REF



DIGITRONICS	
ALBERTSON, NEW YORK	
TITLE: <u>PHOTO DIODE HEAD</u>	
WIRING DIAGRAM	
USED ON:	10,027
DRAWING NO. B-E295	

P-1					
SIG	PIN	LOC	GA	LOC	GA
AC	BLK	F1-1	18		
AC	WHT	TB1-2	18		
AC	GRN	GND LUG	18		
END					

F-1					
SIG	PIN	LOC	GA	LOC	GA
1	P1-WH	18			
2	S1-1	18			

S-1					
SIG	PIN	LOC	GA	LOC	GA
1	F1-2	18	RC1-1	*	
2	TB1-1	18	RC1-2	*	

TB-1					
SIG	PIN	LOC	GA	LOC	GA
1	S1-2	18	T1-BLK	18	
	MI-1	18	BI-1	18	
2	P1-BLK	18	T1-BLK	18	
	MI-2	18	BI-2	18	

T-1					
SIG	PIN	LOC	GA	LOC	GA
BLK	TB1-1	18			
BLK	TB1-2	18			
RED	C1-1	18			
RED	C1-2	18			
BRN	MPC-AC1	18			
BRN	MPC-AC2	18			
BRN	WHY	C3(-)	18		

C-1					
SIG	PIN	LOC	GA	LOC	GA
1	T1-RED	18			
2	T1-RED	18			

R-1					
SIG	PIN	LOC	GA	LOC	GA
1	R2-1	22			
2	MPC-B2R	22			

R-2					
SIG	PIN	LOC	GA	LOC	GA
1	R1-1	22	MPC-15V	22	
2	MPC-B2R	22			

R-22					
SIG	PIN	LOC	GA	LOC	GA
1	R22-2	22	DS1-A	22	
2	R22-1	22			
3	MPC-L2	22			

DS-1					
SIG	PIN	LOC	GA	LOC	GA
A	R22-1	22			
B	MPC-L1	22			

PINCH ROLLER COIL (L1)					
SIG	PIN	LOC	GA	LOC	GA
WHT	MPC-PR1C	22			
WHT	MPC-PR2C	22			

BRAKE COIL (L2)					
SIG	PIN	LOC	GA	LOC	GA
BLK	MPC-B1C	22			
RED	MPC-B2C	22			

MPC BOARD					
SIG	PIN	LOC	GA	LOC	GA
GRY	LAC-GRY	22			
VIO	LAC-VIO	22			
BLU	LAC-BLU	22			
GRN	LAC-GRN	22			
YEL	LAC-YEL	22			
ORN	LAC-ORN	22			
RED	LAC-RED	22			
BRN	LAC-BRN	22			
BLK	LAC-BLK	22			
AC2	T1-BRN	18			
AC1	T1-BRN	18			
+15V	C3(+)	22			
-15V	C2(-)	22			
-15V	S2-C	22			
-15V	S2-NC	22			
-15L	R2-1	22			
PR2R	R1-2	22			
PR2C	PRC(L1)	22			
PR1C	PRC(L1)	22			
L2	R22-3	22			
L1	DS1-B	22			
OV	C3(-)	22			
B2R	R2-2	22			
B2C	BC(L2)	22			
B1C	BC(L2)	22			

LAC BOARD					
SIG	PIN	LOC	GA	LOC	GA
GRY	MPC-GRY	22			
VIO	MPC-VIO	22			
BLU	MPC-BLU	22			
GRN	MPC-GRN	22			
YEL	MPC-YEL	22			
ORN	MPC-ORN	22			
RED	MPC-RED	22			
BRN	MPC-BRN	22			
BLK					

APPENDIX A

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to us. We will then advise you of the disposition to be made of the equipment and arrange for repair or replacement. Include model number, type number and serial number when referring to this instrument for any reason.

WARRANTY

Digitronics Corporation warrants each instrument manufactured by them to be free from defects in material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument returned to the factory for that purpose and to replace any defective parts thereof (except tubes and fuses). This warranty is effective for one year after delivery to the original purchaser when the instrument is returned, transportation charges prepaid by the original purchaser, and which upon our examination is disclosed to our satisfaction to be defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost. In this case, an estimate will be submitted before the work is started.

If any fault develops, the following steps should be taken:

1. Notify us, giving full details of the difficulty, and include the model number, type number and serial number. On receipt of this information, we will give you service instructions or shipping data.
2. On receipt of shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate will be made before work begins provided the instrument is not covered by the warranty.

SHIPPING

All shipments of Digitronics Corporation instruments should be made via Railway Express. The instruments should be packed in a wooden box and surrounded by two or three inches of excelsior or similar shock-absorbing material.

TRANSISTOR SPECIFICATIONS

APPENDIX B

TRANSISTOR and DIODE LIST

Specified in this manual are certain transistors and diodes indicated with an asterisk (*) which are manufactured to our specifications and therefore not available commercially. Listed below are Digitronics part numbers for re-ordering information.

<u>Transistor</u>	<u>Part Number</u>
2N357A	TQ-SB357A
2N317	TQ-SA317A
2N1545	TQ-PA1545
GA004 *	TQ-SAA004
GA005 *	TQ-SB0005
GT1170 *	TQ-SA1170
GT1659 *	TQ-SB1659
2N598	TQ-SA0598

Diodes

1N91	1N2069A (replaces 1N91)
DX2 *	TCRSU0125
DX3 *	TCRSU0125
GTD230 *	TCRSU0125
1N2069A	TCRP2069A

The following pages list the electrical and physical characteristics (and equivalents wherever possible) for these units to facilitate replacement or possible substitution.

I. DIODE	CLASS	MATERIAL	CATAGORY
<u>125</u>	<u>SWITCHING</u>	<u>GERMANIUM</u>	<u>GOLD BONDED JUNCTION (UNIVERSAL TYPE)</u>

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION $80 \text{ mw} @ \phi^{-1} = 1 \text{ mw}/^{\circ}\text{C}$

PIV 35 V (min) @ 100 ua

I reverse 10 V (min) @ 10 ua
50ua @ 55°C

V forward 0.45 @ 10 ma

I peak _____ @ _____

I average 70 ma @ 0.7 V (max)

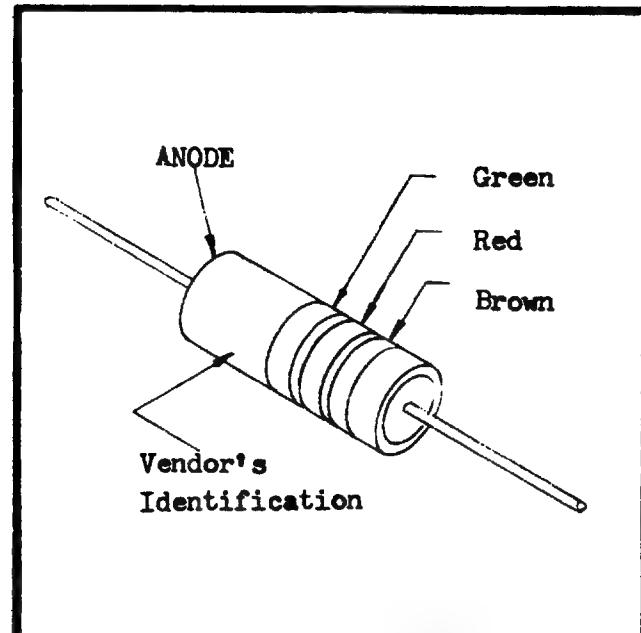
I surge 300 ma @ $V_f \leq 1.5 \text{ V}$ per 10 ms @ 5CPS (5% duty cycle)

NOTE: 1. Recovery as per ED-10

with $tr \leq 0.3 \text{ usec}$

2. Environmental as per ED-67.

3. Replaces DX2 (S-151)
, DX3 (S-152)
GTD230 (S-153)



 DIGITRONICS <small>ALBERTSON, NEW YORK</small>			
TITLE			
DIODE, 125			
A			9/13/62
REV	E.C.O.	CHKD	APP'D
		MO	DAY
		YR.	
USED ON:			DRAWING NO TCR SU0125

I. TRANSISTOR	CLASS	MATERIAL	POLARITY
1170	SWITCH	Ge	PNP

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 M. W. DERATING FACTOR 2.5 MW/°C

IC (max) 40 M.A.

BVCBO(min) 18 @ Ic = 100 uA *VCE (max) 0.5 V @ Ic = 40 mA Ib = 2mA

BVCES (min) _____ @ _____ *VCE (max) _____ @ _____

BVCEO (min) 1.5 @ Ic = 600 uA *VBE (max) 0.5 V @ Ic = 40mA Ib = 2mA

BVEBO(min) 10 @ Ie = 50 uA *VBE (max) _____ @ _____

ICBO (max) 8uA @ VCB = 10V

hFE (min) 25 @ Ic = 40 mA VC = 0.5V

hFE (min) _____ @ _____

* SATURATION

NOTE: 1. Time response as per

ED - 68 with

T_f = 0.7 uS MAX T_o = 0.4 uS MAX

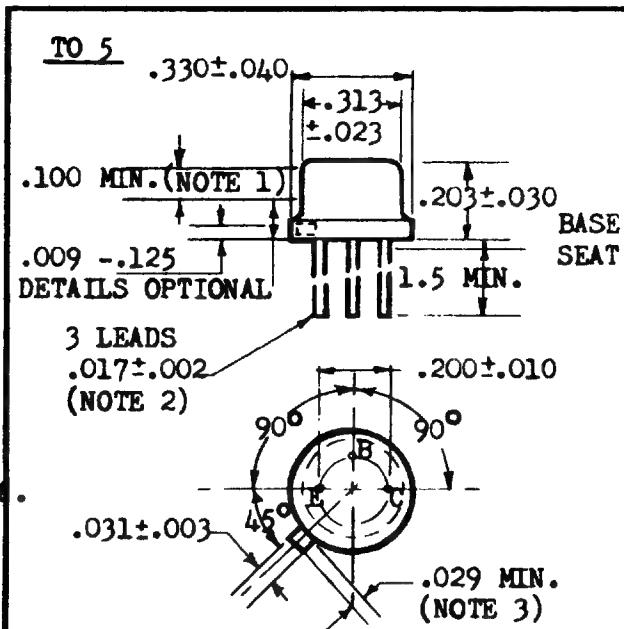
2. Environmental as per

ED - 67

3. Replaceable by TQ-SA0222

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



DIGITRONICS
ALBERTSON, NEW YORK

TITLE:

TRANSISTOR

USED ON:

DIGITRONICS PART NUMBERS

DRAWING NO.

TQ-SA1170

A			7/13/62
REV	E.C.O.	CHKD	APP'D
		MO	DAY YR.

I. TRANSISTOR <u>TQS -GA004</u>	CLASS <u>SWITCH</u>	MATERIAL <u>Ge</u>	POLARITY <u>PNP</u>
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I. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 mw DERATING FACTOR 2 MW/° C

IC (max) 50 ma

BVCB (min) 25 V @ Ic = 25 ua *VCE (max) 0.5 V @ Ic = 5 MA, Ib = 1MA

BVCES (min) 20 V @ Ic = 25 ua *VCE (max) _____ @ _____

BVCEO (min) _____ @ _____ *VBE (max) 0.5V @ Ic = 5MA, Ib = 1MA

BVEB (min) 15 V @ Ie = 25 ua *VBE (max) _____ @ _____

ICBO (max) 3 ua @ Vcb = 10V

hFE (min) 80 @ Ic = 5 ma VCE = 0.5 V

hFE (min) _____ @ _____

* SATURATION

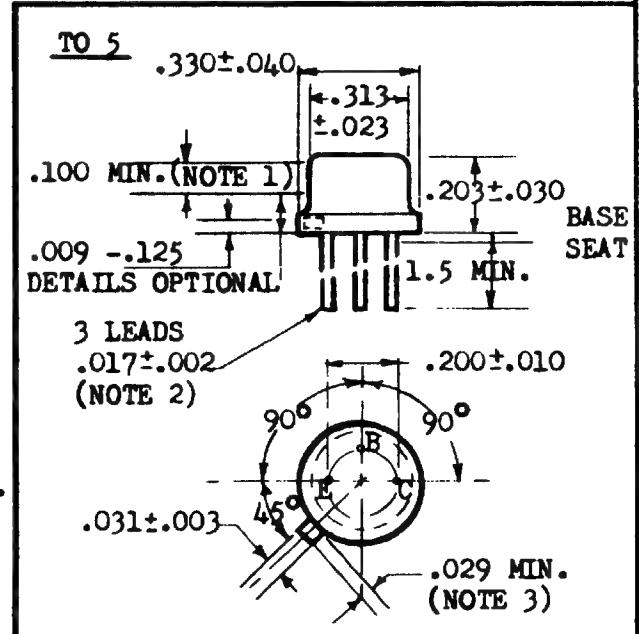
NOTE: Time response as per ED-68 with

Tf = 1us MAX, To = 0.5us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



 DIGITRONICS ALBERTSON, NEW YORK			
TITLE TRANSISTOR			
A			
REV	E.C.O.	CHKD	APP'D
USED ON: DIGITRONICS PART NUMBERS			
			DRAWING NO. TQ-SAA004
7/18/5162			

I. TRANSISTOR	CLASS	MATERIAL	POLARITY
<u>2N 1545</u>	<u>POWER</u>	<u>Ge</u>	<u>PNP</u>

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 80 WATTS DERATING FACTOR 1.25 W/^oC

IC (max) 5 AMP.

B_VCB0 (min) 60 V @ I_c = 20 MA MAX *V_{CE} (max) 0.3 V @ I_c = 3 AMPS I_b = 300MA

B_VCES (min) 45 V @ I_c = .5A *V_{CE} (max) _____ @ _____

B_VCEO (min) 30 V @ I_c = .5A MAX, I_b = 0 *V_{BE} (max) 0.5 V @ I_c = 3 AMPS I_b = 300MA

B_VEB0 (min) 12 V @ I_e = 0.5 MA MAX *V_{BE} (max) _____ @ _____

I_{CBO} (max) 20 MA @ t_b = +90^oC, V_{cb} = 22 V

h_{FE} (min) 75 @ I_c = 3.0 AMPS V_c = 2V

h_{FE} (min) _____ @ _____

* SATURATION Switching time: Test Spec. See Note Below

NOTE: _____

Environmental as per ED-67

NOTE FOR TO 3:

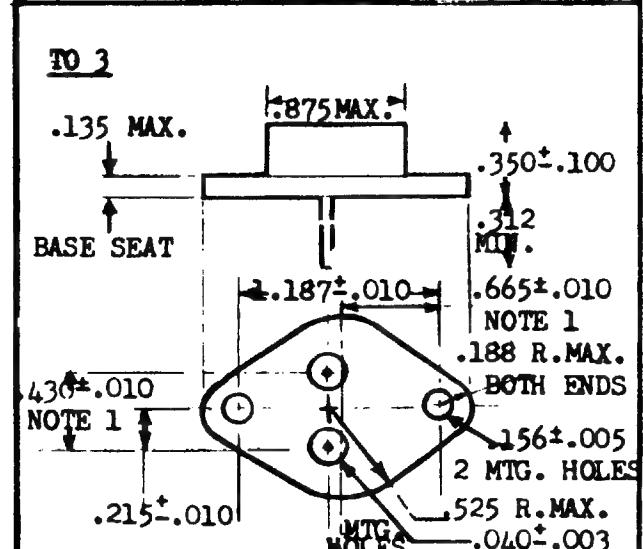
1. These dimensions should be measured at points .050 to .005 below seating plane. When gage is not used, measurement will be made at base seat.

SWITCHING TIME:

TEST SPEC:

SEE (1) Motorola power Transistor Handbook, 1960 Edition, Page 181

(2) Clevite Transistor
Bulletin TB 231-2
March 1, 1962



7/26/62	USER ON:	DRAWING NO.
REV	E.C.O.	CHKD APP'D NO DAY YR.

DIGITRONICS PART NUMBERS

TQ-PA1545

I. TRANSISTOR
2N317A

CLASS
SWITCH

MATERIAL
Ge

POLARITY
PNP

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 MW DERATING FACTOR 2 MW/°C

IC (max) 400 MA

BVCBO (min) 20 V @ Ic = 25 uA MAX *VCE (max) .2 V @ Ic = 400 MA, Ib = 20MA

BVCES (min) @ *VCE (max) @

BVCEO (min) 10 V @ Ic = 600 uA MAX *VBE (max) .95 V @ Ic = 400 MA, Ib=20MA

BVEBO (min) 20 V @ Ie = 25 uA MAX *VBE (max) .45 V @ Ib = 1 MA

ICBO (max) 2 uA @ VCB = 5 V

hFE (min) 20 @ Ic = 400 MA VCE = .25 V

hFE (min) 65 @ Ib = 1 MA VCE = .25 V

* SATURATION

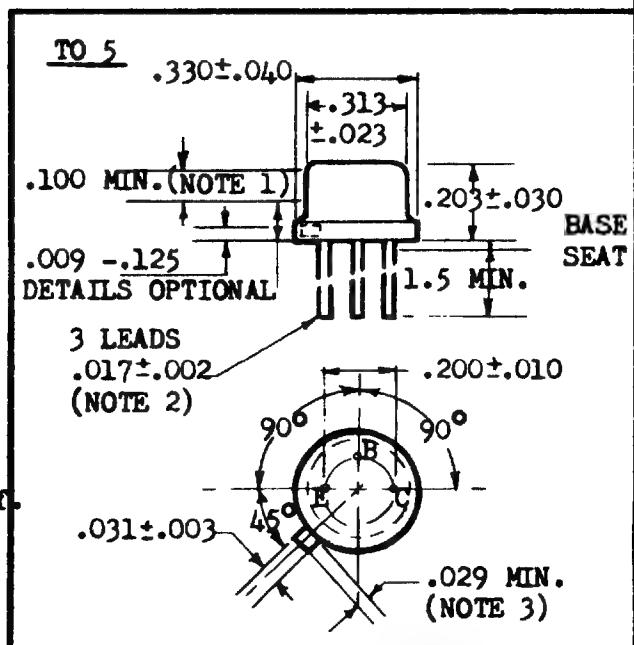
NOTE: Time Response as per ED-69 with

Tf = 0.7us MAX, To = 0.4us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



TITLE: DIGITRONICS ALBERTSON, NEW YORK			
TRANSISTOR			
A		9/13/62	USED ON:
REV	E.C.O.	CHKD APP'D	NO. DAY YR.
DIGITRONICS PART NUMBERS			DRAWING NO. TQ-SA317A

I. TRANSISTOR
2N 357A

CLASS
SWITCH

MATERIAL
Ge

POLARITY
NPN

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 MW DERATING FACTOR 2 MW/°C

IC (max) 400 MA

BVCBO (min) 30 V @ Ic = 25 uA *VCE (max) 0.5 @ Ic = 200 MA IB = 10 MA

BVCES (min) 25V @ Ic = 100 ua *VCE (max) _____ @ _____

BVCEO (min) _____ @ _____ *VBE (max) 0.5V @ Ic = 200 MA IB = 10 MA

BVEBO (min) 6V @ IE = 10 ua *VBE (max) _____ @ _____

ICBO (max) 25ua @ VCB = 30 V

hFE (min) 25 @ Ic = 200 MA Vc = 0.25 V

hFE (min) _____ @ _____

* SATURATION

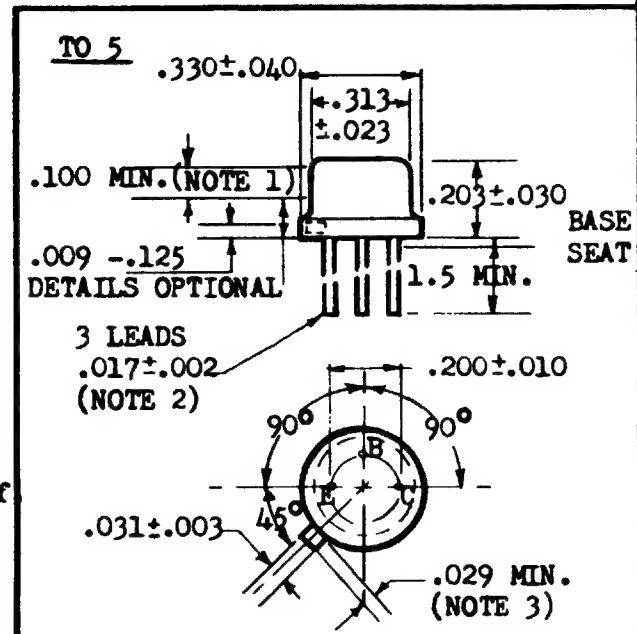
NOTE: Time Response as per ED-69 with

Tf = 0.7us MAX, To = 0.4us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling. Dia. not to exceed .010.
2. Lead dia. variation between .050 and .250 from base seat as specified. Between .250 and 1.5 a max. of .021 dia. is held.
3. Measure from max. dia. of the actual device.



TITLE: TRANSISTOR			
A		9/20/62	USED ON: DIGITRONICS
REV	E.C.O.	CHKD APP'D.	DRAWING NO. TQ-SB357A
NO. DAY YR. DIGITRONICS PART NUMBERS			

I. TRANSISTOR GA 005	CLASS SWITCH	MATERIAL Ge	POLARITY NPN
I. PARAMETERS (at 25 degrees C unless otherwise noted)			
POWER DISSIPATION <u>150 MW</u>	DERATING FACTOR <u>2 MW/° C</u>		
IC (max) <u>50 MA</u>			
BVCBO (min) <u>25V</u> @ <u>Ic = 25 ua</u>	*VCE (max) <u>0.5V</u> @ <u>Ic = 5Ma, Ib = 1MA</u>		
BVCES (min) <u>20</u> @ <u>Ic = 25 ua</u>	*VCE (max) _____ @ _____		
BVCEO (min) _____ @ _____	*VBE (max) <u>0.5V</u> @ <u>Ic = 5MA, Ib = 1MA</u>		
BVEBO (min) <u>15V</u> @ <u>Ie = 25 ua</u>	*VBE (max) _____ @ _____		
ICBO (max) <u>3 ua</u> @ <u>Vcb = 0V</u>			
hFE (min) <u>80</u> @ <u>Ic = 5MA, Vce = 0.5V</u>			
hFE (min) _____ @ _____			

* SATURATION

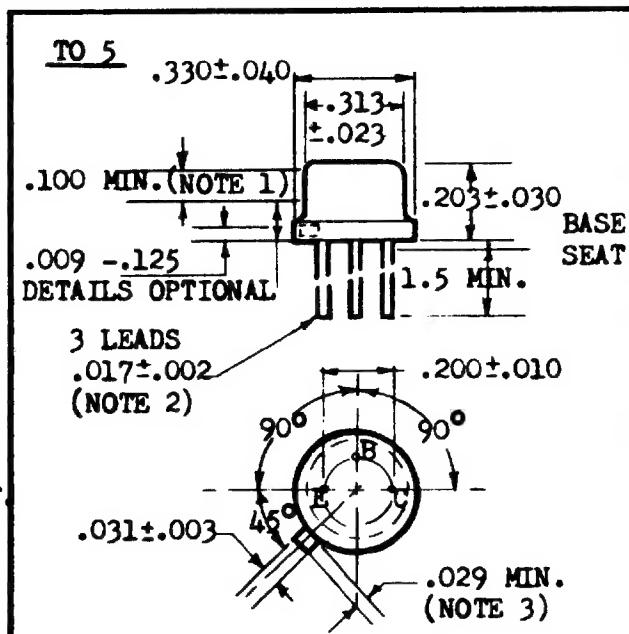
NOTE: Time response as per ED-69

Tf = 1.0us MAX, To = 0.5us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



			DIGITRONICS			
			ALBERTSON, NEW YORK			
TITLE: TRANSISTOR						
A		9/25/62	USED ON:	DIGITRONICS PART NUMBERS		DRAWING NO.
REV	E.C.O.	CHKD APP'D. MO. DAY YR.			TQ-SB0005	

I. TRANSISTOR

CLASS

MATERIAL

POLARITY

1659

SWITCH

Ge

NPN

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION

150 mw

DERATING FACTOR 2 mw/ $^{\circ}$ C

IC (max) 100 mA

BVCBO (min) 35V @ Ic = 25uA *VCE (max) .2V @ Ic = 20mA, Ib = 0.5mA

BVCES (min) 30V @ Ic = 25uA *VCE (max) _____

BVCEO (min) _____ @ _____ *VBE (max) .4V @ Ic = 20mA, Ib = 0.5mA

BVEBO (min) 10V @ IE = 10 uA *VBE (max) _____ @ _____

ICBO (max) 10uA @ VCB = 12 V

hFE (min) 40 @ Ic = 20mA, Vc = 0.5V

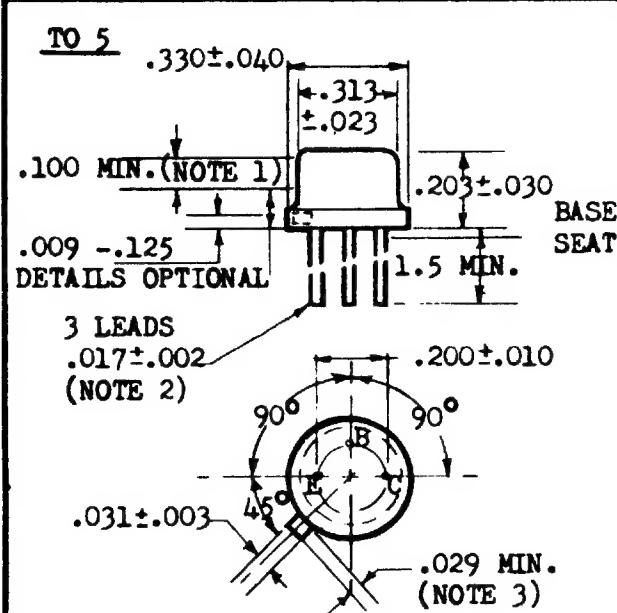
hFE (min) 30 @ Ic = 100 mA Vc = 0.5V

* SATURATION

NOTE: Time Response as per ED-69 with

Tr = 0.7us MAX, Td = 0.4us MAX

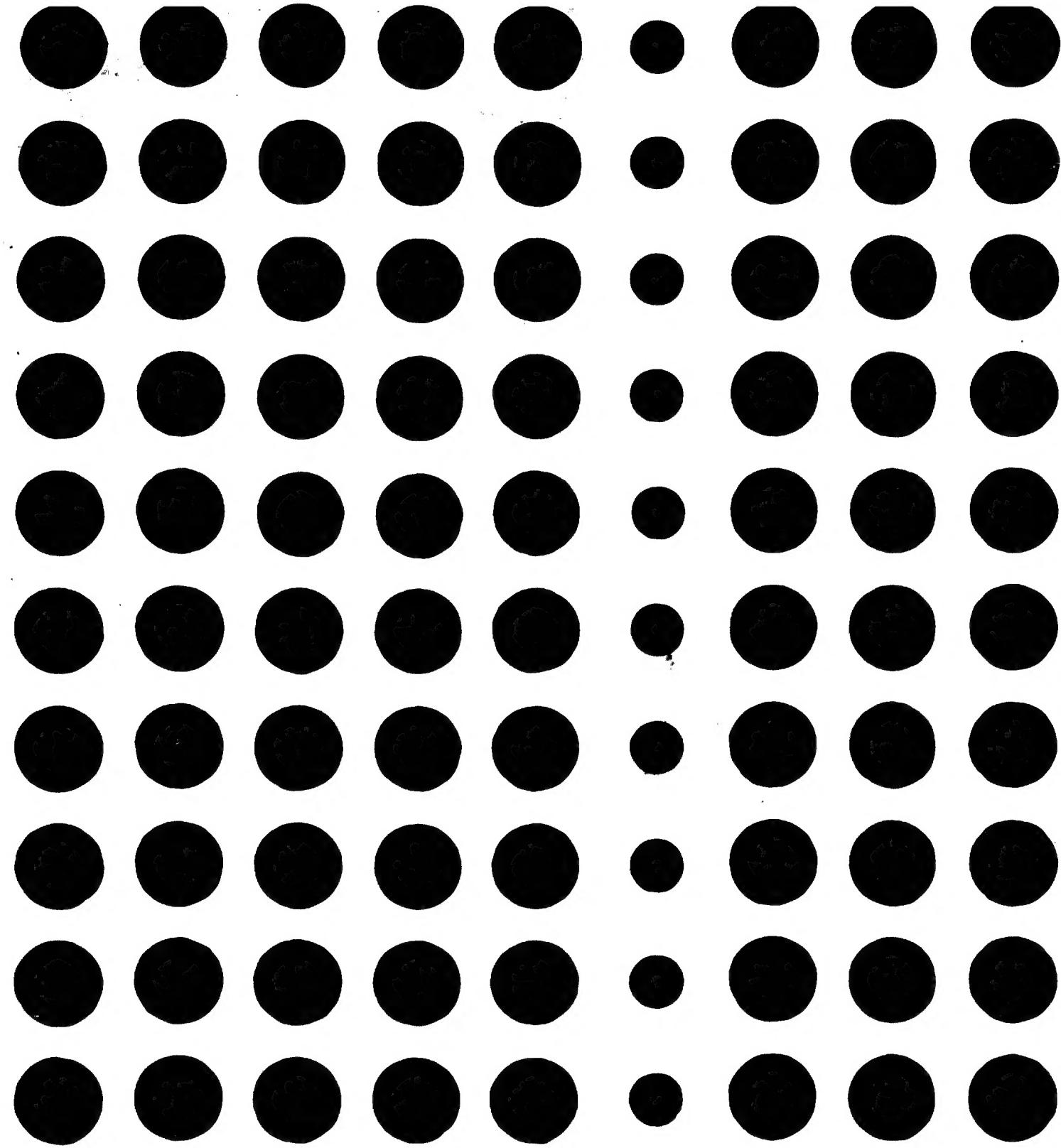
Environmental as per ED-67.



NOTES FOR TO 5:

1. Controlled for automatic handling. Dia. not to exceed .010.
2. Lead dia. variation between .050 and .250 from base seat as specified. Between .250 and 1.5 a max. of .021 dia. is held.
3. Measure from max. dia. of the actual device.

 DIGITRONICS <small>ALBERTSON, NEW YORK</small>			
TITLE: TRANSISTOR			
A	810 9/20/62		
REV	E.C.O.	CHKD	APP'D
USED ON:		DRAWING NO.	
DIGITRONICS PART NUMBERS		TQ- SB1659	
<small>MO. DAY YR.</small>			



DISPLAYRONICS CORPORATION, ALBERTSON L.I.

